

3.0 ENVIRONMENTAL SETTING AND BIOLOGICAL RESOURCES

3.1 *Introduction*

This section presents the environmental setting of the MSHCP Permit Area. It describes the baseline biological conditions that occur on the Solar Sites upon which the impact analysis and conservation program were formulated. This section also includes the environmental setting and biological conditions present on the Conservation Sites. A complete report documenting the surveys conducted on the Conservation Sites, the results of those surveys, and the justifications for adopting the Conservation Sites as appropriate mitigation for the loss of habitat associated with development of the project are presented in Appendix G. The setting is described in the context of the following subject areas:

- Geography;
- Topography;
- Climate;
- Land use;
- Soils;
- Hydrology;
- Jurisdictional wetlands and waters;
- Site characteristics; and
- Covered Species.

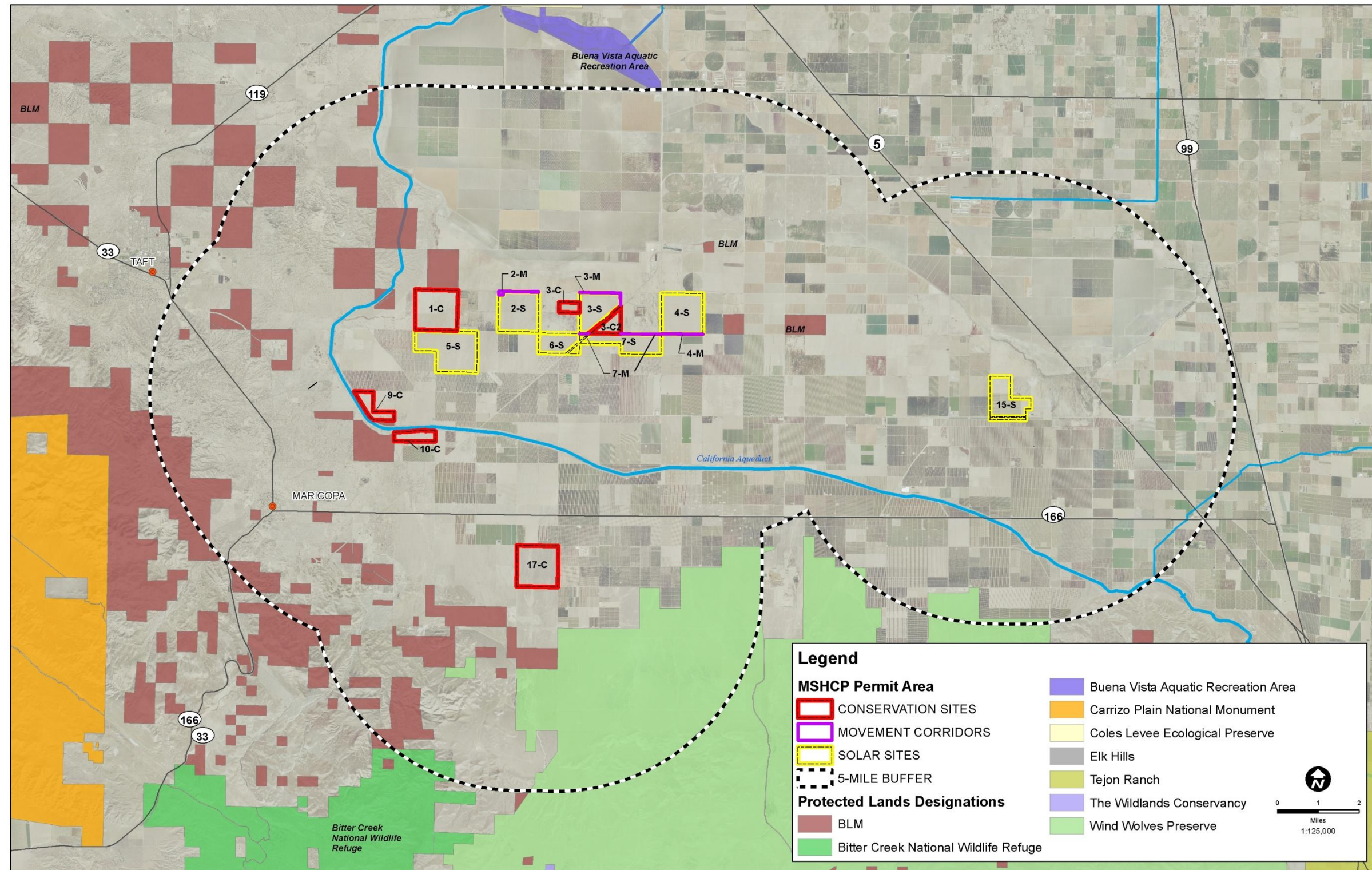
3.2 *Regional Setting*

3.2.1 GEOGRAPHY

The biological resources discussed in this section are those found within the Permit Area and on adjacent lands. The Permit Area is primarily located approximately five miles east of Taft, along South Lake Road and along Old River Road in Kern County, California (see Figure 1-2). Three of the Conservation Sites are contiguous with the Solar Sites, and three are located some distance away: one site is located one mile south of Hwy 166 and approximately 8 miles east of Maricopa (Site 17-C); and two are located approximately one mile southwest of the Solar Sites, bordering the north and south sides of the California Aqueduct (Sites 9-C and 10-C). All of the Conservation Sites are within 6 miles of the Solar Sites, except for Site S-15, which is located approximately 7 miles east of the other Solar Sites and approximately 11 miles northeast of the southernmost Conservation Site (Site 17-C) (Figure 3-1).

3.2.2 TOPOGRAPHY

The topography of the area is mainly flat, cultivated or fallow lands with the only substantial and evident relief provided by ditches, levees, canal berms, and berms along roadways. The project sites are north of the Transverse Range, near the southeastern base of the San Emigdio Mountains, generally to the south and southeast of the historic south shore of Buena Vista Lake.



Elevations on the Permit Area range from approximately 320 feet AMSL in the eastern end of the Permit Area to approximately 900 feet AMSL in the southern portion. Although the lands that comprise the Permit Area are repeatedly disked for weed control (except the 152.9 acres of Site 3-C2, an 83.25-acre portion of Site 9-C, and the 647.7 acres of Site 17-C), some low relief occurs because the sites have not been laser-leveled. Conservation Sites 17-C and portions of Site 9-C contain natural topography. Conservation Site 3-C2 has not been disked for a number of years for weed control, and retains some low topographic relief.

3.2.3 CLIMATE

The project area has a moderate climate with generally mild temperatures throughout the year. The weather is hot and dry in the summer, and cold and moist in the winter. The average temperature in the winter is 48.5 degrees Fahrenheit (°F) and the average daily minimum winter temperature is 38.3°F. Winter rains are interspersed with spells of cloudy, foggy, or sunny weather. The average summer temperature is 80.7°F and the average daily maximum summer temperature is 94.8°F. The annual average precipitation is 6.32 inches, with all of the precipitation falling as rain. The sun shines 93 percent of the time in the summer, and 73 percent of the time in the winter. The prevailing wind is from the west-northwest. Average wind speed is highest in April and May, at 7.7 miles per hour. Snowfall has not been recorded at Maricopa, and measurable snow is a rare occurrence in Bakersfield (USDA 2009). The growing season is over 350 days per year. Table 3-1 provides the monthly maximum, minimum and mean temperature and precipitation recorded for the Maricopa area.

Table 3-1
Monthly Maximum, Minimum, and Mean Temperature and Precipitation
(Maricopa climate station: <http://www.idcide.com/weather/ca/taft.htm>)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Max °F	56.9	63.8	68.6	75.9	83.9	92.2	96.9	95.8	90.0	80.5	66.1	57.2	77.3
Min °F	38.6	42.9	45.7	49.4	56.6	63.9	69.8	68.7	64.7	56.6	45.3	38.0	53.4
Mean °F	47.8	53.4	57.2	62.7	70.3	78.1	83.4	82.3	77.4	68.6	55.7	47.6	65.4
Inches of precipitation	1.16	1.13	1.40	0.51	0.21	0.04	0.00	0.07	0.26	0.20	0.63	0.71	6.32

3.2.4 REGIONAL LAND USE

Much of the native habitat in the project region has been converted to agricultural production, oil field development, urban development, and associated infrastructure (e.g., highways, water conveyance facilities, transmission lines), but remnant stands of native habitat exist at scattered localities. Most of the existing native habitat occurs as recovered lands that have at one time been disturbed by dryland farming, extensive sheep and/or cattle grazing, oil extraction activities, or other causes. Some of the lands containing remaining native habitat have subsurface oil reserves, and oil extraction activities have caused varying levels of disturbance. Much of the remaining native habitat within the region occurs on lands owned and managed by the Bureau of Land Management (BLM). Extensive public and protected land lies to the south and west of the project, but land to the north and east is mostly privately owned and not protected.

Several Ecological Preserves/Reserves and other protected lands are located in the region (Figure 3-1):

- The Lokern and Elk Hills Ecological Reserves, which are administered by the CDFW;
- The Tule Elk State Natural Reserve located near Tupman, which is administered by the California Department of Parks and Recreation;
- The Buena Vista Aquatic Recreation Area, which is administered by the County of Kern;
- The Wind Wolves Preserve, which is administered by The Wildlands Conservancy;
- The Bitter Creek National Wildlife refuge, which is administered by the USFWS; and
- The Carrizo Plains National Monument and the Carrizo Plains Ecological Reserve, which are administered by the USFWS and CDFW.

The Permit Area lands are zoned for agricultural uses and are currently under Williamson Act contracts. All sites are disked for weed control on a repeated basis, with the exception of 3-C2, 17-C, and the lower portion of site 9-C. Adequate water for financially viable farm production is not currently available and there are no irrigation systems present on the majority of the parcels. Scattered wells and ponding basins are present on some parcels. A petition to remove the parcels from the Williamson Act contracts was approved by the County of Kern on March 29, 2011.

3.2.5 SOILS

Soils in the project area are highly variable. According to the United States Department of Agriculture (USDA) Soil Conservation Service map for Kern County, nine different soils are within the project sites (Table 3-2; Figure 3-2), as follows:

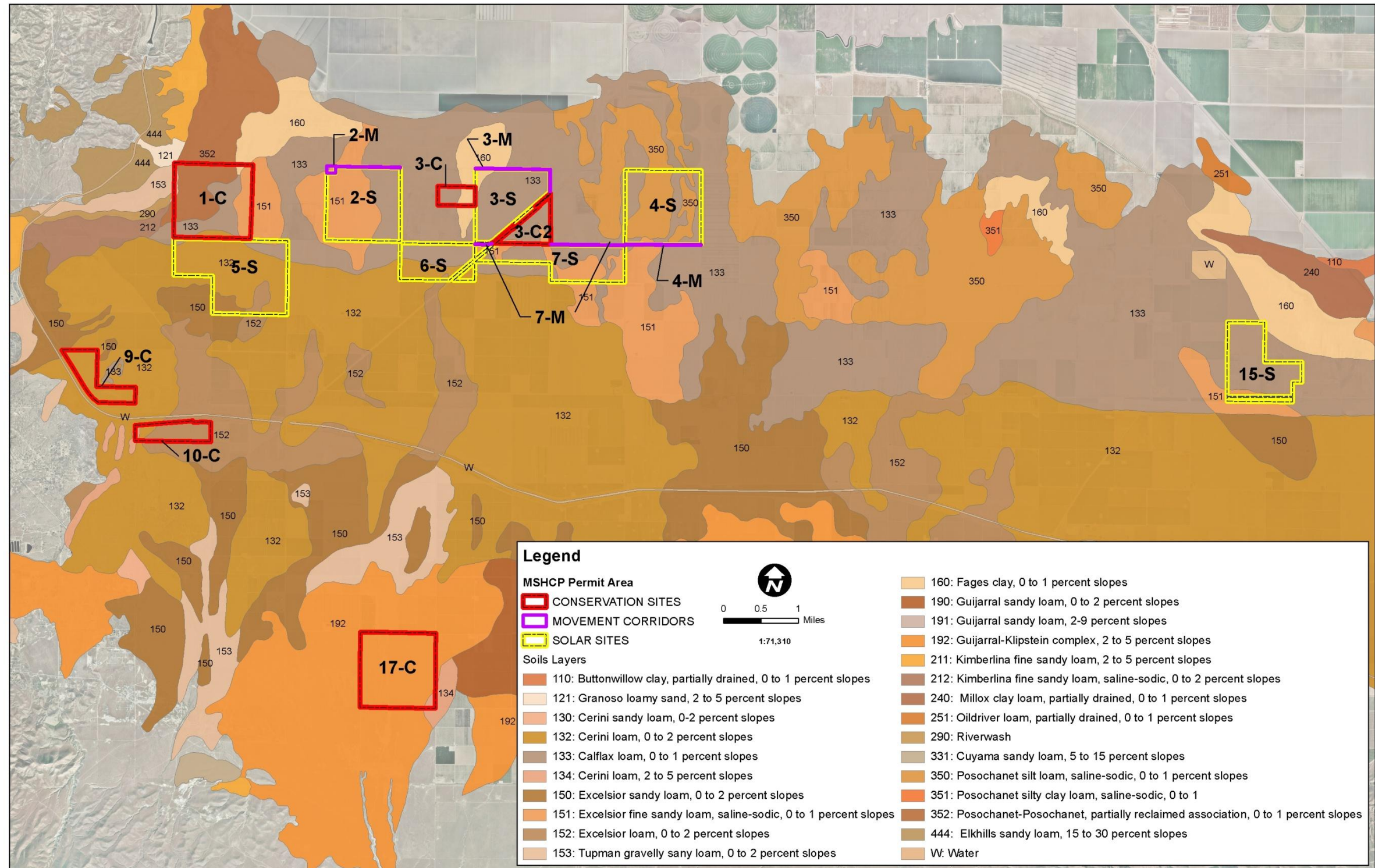
- Cerini loam;
- Calflax loam;
- Excelsior fine sandy loam;
- Excelsior sandy loam;
- Fages clay;
- Posochanet associations;
- Posochanet silt loam (saline-sodic soil);
- Posochanet silty clay loam (saline-sodic soil);
- Tupman gravelly sandy loam; and
- Gujarral-Klipstein complex.

3.2.6 HYDROLOGY

The Maricopa Sun Solar Complex project is located within a semi-arid region, which relies on rainfall, groundwater, and the Kern River for its water supply. Most rainfall occurs in the winter and spring, as is typical for areas with this climate.

Table 3-2
Soil Types Present on the
Maricopa Sun Solar Complex Permit Area Lands

Location	Soil Type Present
Site 1-C	132-Cerini loam (0-2 percent slopes), 133-Calflax loam (0-1 percent slopes), 151- Excelsior fine sandy loam (saline-sodic, 0-1 percent slopes), 153-Tupman gravelly sandy loam (0-2 percent slopes), 160-Fages clay (0-1 percent slopes), and 352-Posochanet-Posochanet (partially reclaimed association, 0-1 percent slopes)
Site 2-S, 2-M	133-Calflax loam (0-1 percent slopes) and 151- Excelsior fine sandy loam (saline-sodic, 0-1 percent slopes)
Site 3-S, 3-M	133-Calflax loam (0-1 percent slopes), 160-Fages clay (0-1 percent slopes)
Site 3-C	133-Calflax loam (0-1 percent slopes), 160-Fages clay (0-1 percent slopes)
Site 3-C2	133-Calflax loam (0-1 percent slopes), 151- Excelsior fine sandy loam (saline-sodic, 0-1 percent slopes)
Site 4-S, 4-M	133-Calflax loam (0-1 percent slopes) and 350-Posochanet silt loam (saline-sodic, 0-1 percent slopes)
Site 5-S	132-Cerini loam (0-2 percent slopes), 133-Calflax loam (0-1 percent slopes), 150-Excelsior sandy loam (0-2 percent slopes), 151- Excelsior fine sandy loam (saline-sodic, 0-1 percent slopes), 152-Excelsior loam (0-2 percent slopes)
Site 6-S	132-Cerini loam (0-2 percent slopes), 133-Calflax loam (0-1 percent slopes), and 152-Excelsior loam (0-2 percent slopes)
Site 7-S, 7-M	133-Calflax loam (0-1 percent slopes), 151-Excelsior fine sandy loam (saline-sodic, 0-1 percent slopes)
Site 9-C	132-Cerini loam (0-2 percent slopes), 133-Calflax loam (0-1 percent slopes), and 150-Excelsior sandy loam (0-2 percent slopes)
Site 10-C	132/134-Cerini loam (0-2 percent slopes/2-5 percent slopes), and 152-Excelsior loam (0-2 percent slopes)
Site 15-S	133-Calflax loam (0-1 percent slopes), 151-Excelsior fine sandy loam (saline-sodic; 0-2 percent slopes), and 160-Fages clay (0-1 percent slopes)
Site 17-C	134-Cerini loam (0-2 percent slopes) and 192-Guijarral-Klipstein complex (2 -5 percent slopes)



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USDA SOILS MAP, MARICOPA SUN SOLAR COMPLEX, KERN COUNTY, CALIFORNIA

Figure
3 - 2

The only significant water course in the immediate area of the Project site is the Kern River. The Kern River begins on the western slope of Mount Whitney in the southern Sierra Nevada Mountains and flows southwest. Several minor streams flow into the Kern River, which exists as a contained basin except during high runoff years. The Kern River is fully diverted and used (Kern County Planning and Community Development Department 2010); however, during very wet years, the Kern River reaches the flood channel located on the west of the valley floor and carries water into the Buena Vista Lake Basin that is subject to flooding and ponding (USDA 2009). Other sources of water in the Buena Vista Lake Basin include intermittent streams from the south, such as Bitter Creek, Santiago Creek, Los Lobos Creek, the San Emigdio Creek complex, Pleito and Pleitito Creeks, the Salt Creek complex, and Tecuya Creek, which drain the San Emigdio Mountains portion of the Transverse Ranges. These waters are largely dispersed before reaching the historic Buena Vista Lake Bed. The drainage ways are dry much of the year but carry an extremely heavy flow during thunderstorms and spring runoff (USDA 2009).

A portion of the project area is currently mapped by the Federal Emergency Management Agency (FEMA) as Flood Zone A, and accordingly is within the 100-year flood zone (Figure 3-3). Kern River flows have been regulated since the completion of Isabella Dam in 1953 (Kern County Planning and Community Development Department 2010). Based on flood maps, flooding is likely related to heavy rain fall in the Traverse Range, which flows down the alluvial slopes via streams to the south.

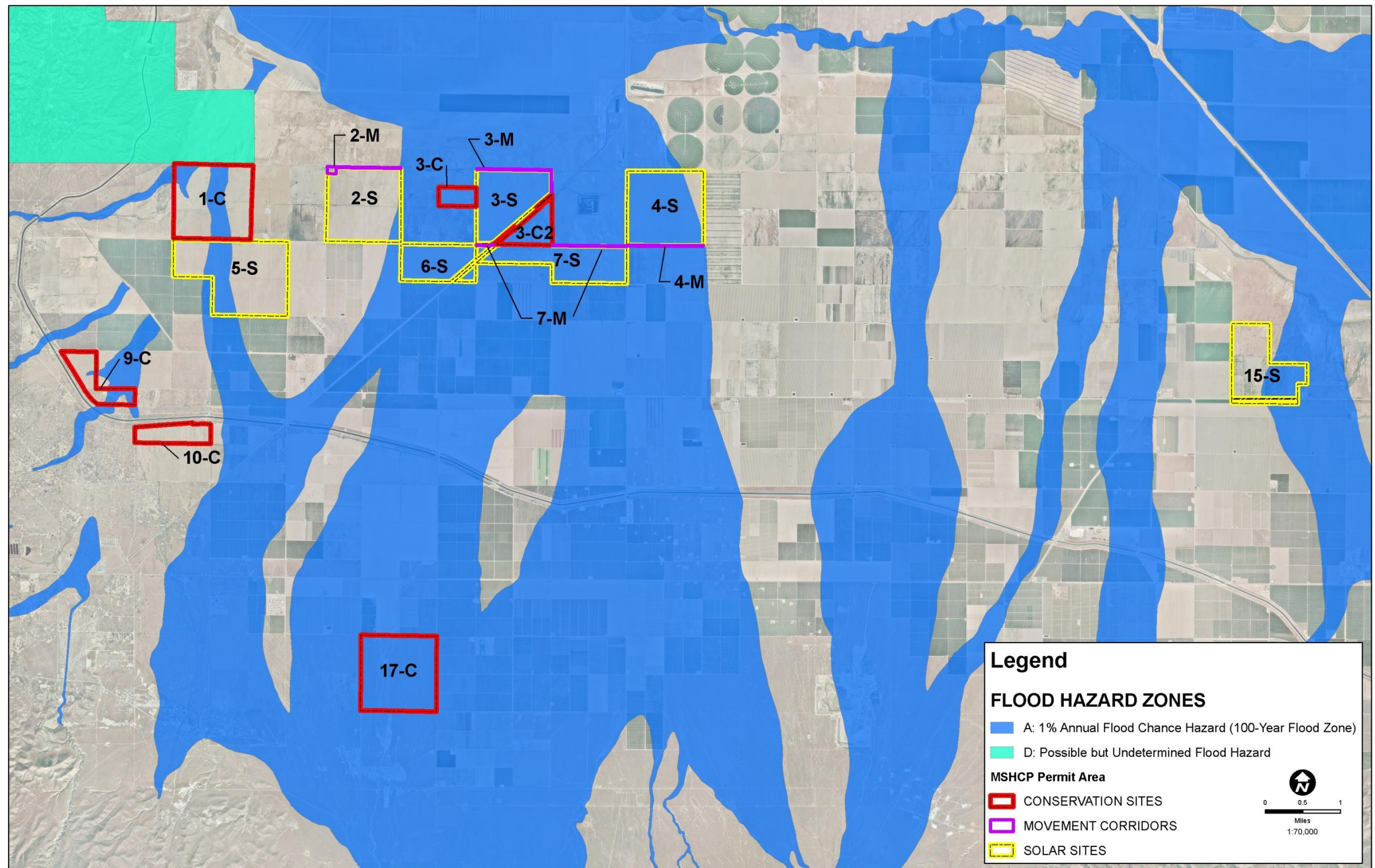
3.2.7 JURISDICTIONAL WETLANDS AND WATERS

The US Army Corps of Engineers (USACE) has regulatory authority over the Clean Water Act (CWA), as provided for by the EPA. The USACE has established specific criteria for the determination of wetlands based upon the presence of wetland hydrology, hydric soils, and hydrophilic vegetation. The presence of wetlands on the Solar Sites was evaluated using these standard wetland delineation criteria. A wetland delineation report was prepared and submitted to the USACE for verification (Quad Knopf 2010b). The presence of wetlands was also evaluated on most of the Conservation Sites. Wetland surveys were conducted on Conservation Sites 1-C, 3-C2, 9-C, and 10-C, including areas within 100 feet of their perimeters (Appendix G). Conservation Sites 3-C and 17-C were not surveyed.

Wetlands, streams, reservoirs, sloughs, and ponds typically meet the criteria for federal jurisdiction under Section 404 of the CWA and state jurisdiction under the Porter-Cologne Water Quality Control Act. Streams and ponds typically meet the criteria for state jurisdiction under Section 1602 of the California Fish and Game Code.

Four types of wetlands and other waters were identified to occur within, or immediately adjacent to the Solar Sites (Quad Knopf 2010a).

- Freshwater emergent wetland
- Waters of the U.S.
- Artificial ponding basins
- Unlined canals



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FLOOD HAZARD MAP, MARICOPA SUN SOLAR COMPLEX, KERN COUNTY, CALIFORNIA

Figure
3 - 3

Wetlands that are present on the Solar Sites include one Freshwater Emergent wetland that has been disked (located within Site 2-S). One ponding basin occurs adjacent to the south side of Site 7-S, but this basin is outside of the Permit Area (Appendices B and G). Non-wetland features present include a tributary, two unlined canals, and one “other water.” Within the Conservation Sites are one tributary and one large intermittent wash. No wetlands were identified within the Conservation Sites.

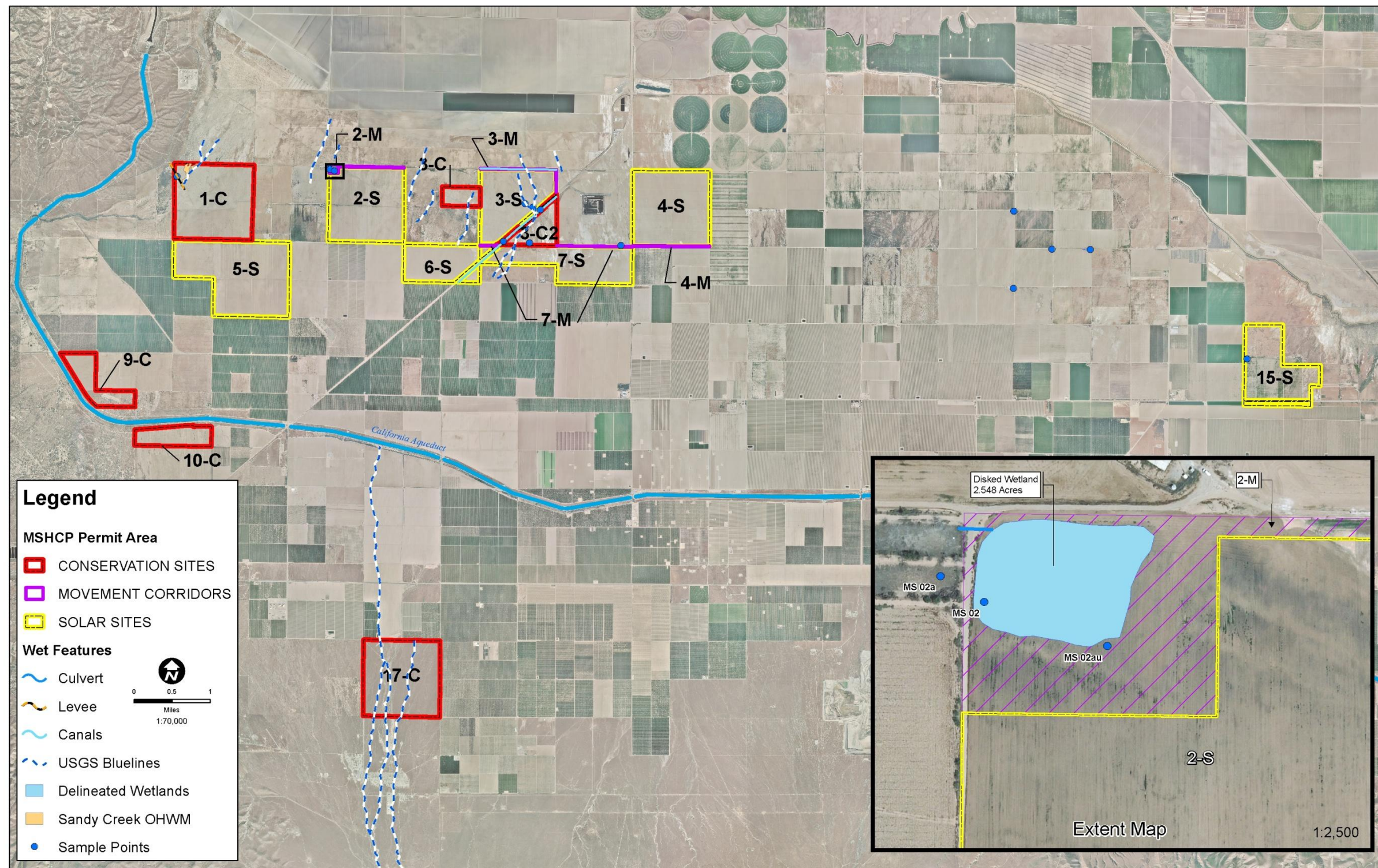
The wetland and non-wetland features are described in Table 3-3 and in the following paragraphs (Quad Knopf 2010b). A wetland delineation map is presented on Figure 3-4.

Table 3-3
Wetlands and Other Waters Identified within the
Maricopa Sun Solar Complex Permit Area

Wetland	Location	Type	Acreage/Length
MS 02	Site 2-S	Freshwater Emergent (PEMFX)	2.55 acres
MS 05	South of Site 7-S, not in Permit Area.	Ponding Basin (PUBFX)	3.88 acres
Other Waters			
Tributary	Site 1-C	Tributary	10.45 acres/3,887 feet
Blue-line drainages	Site 17-C	Large Intermittent Wash	2.42 acres, 20 feet by 1 mile long
Canal #1	Site 3-S	Unlined Canal	0.97 acres/5,288 feet
Canal # 2	Sites 6-S and 7-S	Unlined canal	2.06 acres/8,964 feet

Freshwater Emergent Wetland

Based upon a review of the Wetland Delineation report (Quad Knopf 2010a) and a site visit to verify those findings by USACE, the only jurisdictional wetland within the Solar Sites is the freshwater emergent wetland in the northwest corner of Site 2-S. This wetland will be incorporated into the Movement Corridor that traverses the north portion of that site. The burned root crowns of common cattails (*Typha latifolia*), an obligate wetland indicator, are clearly visible in the disked soil, and the soil is hydric. This wetland lies within a shallow basin and is approximately 2.55 acres in extent (Table 3-3). Immediately adjacent, but outside the project boundary, is an artificially bermed ponding basin, which also meets USACE wetland criteria. This ponding basin is all that remains of the once more extensive wetland mapped by the National Wetland Inventory (NWI) at this site. The land around these features is disked. The remnant wetland on Site 2-S and the wetland to the west that occurs off site are connected by a culvert that crosses under a dirt road that separates these two wetland features. This wetland area will not be impacted by the project, and exclusion barrier fencing will be established between the wetland and the work area to eliminate the potential for any adverse affects to the wetland. The wetland area on Site 2-S will be enhanced by cessation of disking.



WETLAND DELINEATION MAP,
MARICOPA SUN SOLAR COMPLEX, KERN COUNTY, CALIFORNIA

Figure
3 - 4

Artificial Ponding Basins

One artificial ponding basin that meets the criteria for wetlands was found south of Site 7-S, off of but adjacent to the Permit Area. This basin is classified by the Cowardin System as PUBFx (Palustrine, Unconsolidated Bottom, Semi-permanently flooded, excavated). This feature is a narrow pond running east-west, 3.88 acres in extent (Table 3-3). Upland habitat adjacent to this wetland is ruderal. The outflow of this basin feeds into a channel off site that runs to the north and has tamarisk (*Tamarix chinensis*) and Fremont cottonwood (*Populus fremontii*) along the banks. Quailbush (*Atriplex lentiformis*) and five-hook bassia (*Bassia hyssopifolia*) are profuse in the basin, and this feature exhibits hydric soils and wetland hydrology. Two similar features were mapped by the NWI immediately to the south, but these have been removed sometime in the past and are no longer present. This pond and the associated habitat will not be impacted by the project, and exclusion barrier fencing will be established between this pond and the work area to eliminate the potential for any impacts to this area.

Other Waters

A Water of the U.S. is located within the northeast portion of Site 1-C. Site 1-C is a Conservation Site and the jurisdictional waters within Site 1-C will be avoided and not disturbed by construction or conservation activities, improvements or enhancements. Several blue-line intermittent streams occur on Sites 3-S, 3-C, 3-C2, and 7-S. These are isolated waters that currently do not exhibit beds, banks or other characteristics of Waters of the U.S. Based upon site verification by the USACE, these were determined not to be under federal jurisdiction and do not currently meet the criteria of “other waters.”

Non-wetland Features: Unlined Canals

Two unlined canals occur within the Permit Area as described below.

- **Canal #1** collects flood waters and drains the cultivated lands in the northern portion of the Project area. It runs west to east along the northern border of Solar Site. The length of this feature along the northern border of Solar Site 3-S is 5,288 feet, and the average width of the Ordinary High Water (OHW) is eight feet. The OHW acreage of this feature on Site 3-S is 0.97 acres. The bottom is largely unvegetated, but the banks of the canal support annual sunflower (*Helianthus annuus*), quailbush, tamarisk, and five-hook bassia. This feature will not be impacted by the project. A Movement Corridor has been established along this canal and it will be kept intact.
- **Canal #2** has its source at Santiago Creek near State Route 166 and drains orchards to the south of the Permit Area. This feature is an artificial, unlined canal from SR 166 to its terminus along the northeast corner of Solar Site 3-S (Figure 3-4). The OHW width is approximately 10 feet, and the length of the canal on site is 8,964 feet. The OHW acreage of this feature within the Permit Area is 2.06 acres. Quailbush, annual sunflower, and five-hook bassia are present on its banks throughout most of the on-site length. South of the Permit Area, it is mostly devoid of vegetation.

This feature lies within an existing public easement (railway easement). The Solar Development Footprint does not include this easement and this canal will be protected by a mandatory 30-foot setback from the easement.

3.2.8 SITE CHARACTERISTICS

The Project region once supported a wide variety of plant and wildlife species, but much of the diversity and abundance has been reduced and species composition has been altered by dramatic changes in land use. Land use in the region that has contributed to significant declines in plant and wildlife diversity include the conversion of native lands to agriculture, disturbance by oil extraction and associated conveyance structures, urbanization; and the construction of infrastructures and utilities, including pipelines, roads, canals, and power transmission lines. The loss of habitat associated with these disturbances has resulted in many species being listed as threatened or endangered by the CDFW and the USFWS. These species are protected by the FESA and/or the CESA. Other species are listed as species of special concern by the agencies and are afforded a lesser level of protection. Briefly, special-status species are defined as plants and animals that are legally protected under FESA, CESA, or other regulations, and species that are considered sufficiently rare by the scientific community to qualify for such listing (see Section 3.3.1).

The Permit Area of this MSHCP encompasses a total of 5,784.3 acres. The Solar Sites consists of 3,798.2 acres (which include mandatory setbacks and Movement Corridors). The Solar Development Footprints total 3,700.5 acres, and the Movement Corridors encompass 33.8 acres (see Table 2-1).

The seven Solar Sites (Sites 2-S, 3-S, 4-S, 5-S, 6-S, 7-S, and 15-S), including the Movement Corridors, have been disked for weed control on a biannual basis. Due to the lack of available water, none of the land that is proposed for development (Solar Development Footprints) has been utilized in the past eight years for agricultural purposes. All of the land surrounding the proposed project sites is designated and zoned for agriculture and most of it is in active agricultural production, but some isolated parcels are in an unfarmed state and contain some native species (see Section 2.2, Figure 2-2). All of the Solar Sites are kept free of natural vegetative communities through biannual disking of each site. Primarily weedy species sprout between disking activities. The only native plant that sprouts in significant numbers following disking is seepweed (*Suaeda nigra*), which occurs in scattered localities. Some individuals of other species occur incidentally on some of the Solar Sites. Because disking occurs in the spring and fall of each year, the seepweed and other species never become established to any great degree and mostly remain as short seedlings, rarely maturing to established shrubs. Some surrounding parcels contain remnants of native Saltbush Scrub and Alkali Sink Scrub habitat in various sized blocks, which are highly fragmented and isolated from one another. Specific site occurrence information on vegetation is provided in Table 3-4.

Table 3-4
Plant Species Occurring on Solar Sites and
Adjacent Lands of the Maricopa Sun Solar Complex
 (Source: Quad Knopf 2010a, 2010c)

Family Name	Scientific Name	Common Name	Project Site
Amaranthaceae	<i>Amaranthus</i> sp.	Amaranth	Adjacent to Site 4-S
Apoynaceae	<i>Asclepias fascicularis</i>	Narrow-leaf milkweed	Adjacent to Site 15-S
Asclepiadaceae	<i>Asclepias fascicularis</i>	Mexican milkweed	Adjacent to Site 15-S
	<i>Centaurea solstitialis</i>	Yellow starthistle	Occurring on Site 15-S
	<i>Helianthus annuus</i>	Annual sunflower	Occurring on Site 3-S
	<i>Helianthus</i> sp.	Sunflower	Adjacent to Site 3-S
	<i>Baccharis salicifolia</i>	Mulefat	Adjacent to Site 15-S
	<i>Achillea millefolium</i>	Yarrow	Adjacent to Site 15-S
	<i>Isocoma acradenia</i>	Alkali goldenbush	Occurring on Site 2-S, 15-S
	<i>Lactuca serriola</i>	Wire lettuce	Occurring on Site 3-S, 5-S
	<i>Xanthium strumarium</i>	Common cocklebur	Occurring on Site 3-S
	<i>Amsinckia menziesii</i>	Fiddleneck	Occurring on Site 2-S, 3-S, 15-S
Boraginaceae	<i>Heliotropium curassavicum</i>	Salt heliotrope	Occurring on Site 2-S, 3-S
	<i>Sisymbrium irio</i>	London rocket	Occurring on Site 3-S, 5-S, 6-S, 15-S
Brassicaceae	<i>Brassica nigra</i>	Black mustard	Occurring on Site 3-S

The six Conservation Sites (Site 1-C, Site 3-C, Site 3-C2, Site 9-C, Site 10-C, and Site 17-C) total 1,894.4 acres. The Solar Sites will be converted to Conservation Sites once the solar facilities are decommissioned, resulting in a total of 5,692.6 acres of compensatory lands provided at the end of the project (see Table 2-1). The Movement Corridors will be managed as conservation land during the life of the project, but will be conserved in perpetuity along with the Solar Sites and Conservation Sites once the Project is decommissioned. With the exception of Sites 3-C2, the southern 83.25 acres of Site 9-C, and all of 17-C, all of the lands within the Permit Area are periodically disked for weed control. Site 3-C2 was previously disked, but has not been disked for some time and has recovered from previous disturbances. The only native plant that sprouts in significant numbers following disking is seepweed, which occurs in scattered localities, particularly on Site 3-C. Site 1-C also contains some scattered saltbush shrubs and *Isocoma*, primarily along the levee in the northwest corner of the site (which totals 2.44 acres), but some scattered quailbush shrubs survive disking. Native saltbush scrub habitat occurs on 83.25 acres of Site 9-C, and all of Site 17-C is vegetated with a matrix of annuals grassland, saltbush scrub, and *Isocoma*. Forty-four plant species occur within the Conservation Sites, Movement Corridors, and surrounding adjacent lands (Table 3-5).

Table 3-5
Plant Species Occurring within Conservation Sites, Movement Corridors, and
Adjacent Lands of the Maricopa Sun Solar Complex
(Source: Quad Knopf 2010a, 2010c)

Family Name	Scientific Name	Common Name	Project Site
Asteraceae	<i>Ambrosia acanthicarpa</i>	Annual bursage	Adjacent to Site 10-C
	<i>Centaurea solstitialis</i>	Yellow starthistle	Adjacent to Sites 9-C, 10-C
	<i>Conyza coulteri</i>	Coulter's conyza	Adjacent to Sites 9-C, 10-C
	<i>Hemizonia kelloggii</i>	Kellogg's tarweed	On and adjacent to Site 9-C
	<i>Heterotheca grandiflora</i>	Telegraph weed	On and adjacent to Site 9-C
	<i>Helianthus annuus</i>	Annual sunflower	Occurring on Sites 3-C, 3-C2, 3-M; Adjacent to Site 10-C
	<i>Helianthus</i> sp.	Sunflower	Adjacent to Site 3-C2, 3-M
	<i>Isocoma acradenia</i>	Alkali goldenbush	Occurring on Sites 2-M, 9-C; Adjacent to Sites 9-C, 10-C,
	<i>Lactuca serriola</i>	Wire lettuce	Occurring on Sites 9-C, 3-C, 3-C2, 3-M; Adjacent to Site 9-C
	<i>Xanthium strumarium</i>	Common cocklebur	Occurring on Sites 3-C, 3-C2, 3-M
Boraginaceae	<i>Amsinckia menziesii</i>	Fiddleneck	Occurring on Sites 1-C, 2-M, 3-C, 3-C2, 3-M, 9-C, 10-C; Adjacent to Sites 9-C, 10-C
	<i>Heliotropium curassavicum</i>	Salt heliotrope	Occurring on Sites 3-S, 3-C, 3-C2, 3-M
Brassicaceae	<i>Sisymbrium irio</i>	London rocket	Occurring on Sites 1-C, 3-S, 3-C, 3-C2, 3-M, 9-C
	<i>Brassica nigra</i>	Black mustard	Occurring on Sites 3-S, 3-C, 3-C2, 3-M
	<i>Lepidium</i> sp.	Peppergrass	Adjacent to Site 10-C
	<i>Raphanus sativus</i>	Radish	Adjacent to Site 9-C
	<i>Sisymbrium orientale</i>	Eastern rocket	Adjacent to Site 9-C
Chenopodiaceae	<i>Salsola tragus</i>	Russian thistle	Adjacent to Sites 9-C, 10-C; Occurring on Sites 3-C, 3-C2, 3-M, 9-C, 10-C
	<i>Bassia hyssopifolia</i>	Five-hook bassia	Occurring on Sites 3-C, 3-C2, 3-M, 10-C ; Adjacent to Site 10-C
	<i>Atriplex lentiformis</i>	Quailbush	Occurring on Sites 1-C, 3-C, 3-C2, 3-M, 9-C, Adjacent to Site 10-C
	<i>Chenopodium album</i>	Lamb's quarters "weedy chenopods"	Occurring on Sites 3-S, 3-C, 3-C2, 3-M
	<i>Suaeda nigra</i>	Seepweed	Occurring on Sites 3-S, 3-C, 3-C2, 3-M, 17-C
	<i>Atriplex polycarpa</i>	Allscale saltbush	Occurring on Site 9-C; Adjacent to Sites 9-C, 10-C
	<i>Convolvulus arvensis</i>	Orchard bindweed	Occurring on Site 1-C
	<i>Convolvulus</i> sp.	Morning glory	Occurring on Site 1-C
Euphorbiaceae	<i>Eromocarpus setigerus</i>	Dove weed	Adjacent to Site 10-C
Lamiaceae	<i>Trichostema ovatum</i>	Vinegar Weed	Occurring on Site 17-C
	<i>Marrubium vulgare</i>	White horehound	Adjacent to Site 10-C
	<i>Malacothamnus</i> sp.	Bushmallow	Adjacent to Site 9-C
Plantaginaceae	<i>Bromus diandrus</i>	Ripgut brome	Occurring on Site 9-C; Adjacent to Site 9-C
Poaceae	<i>Bromus hordeaceus</i>	Soft brome	Occurring on 17-C; Adjacent to Sites 9-C and 10-C
	<i>Bromus madritensis</i> ssp. <i>rubens</i>	Red brome	Occurring on Sites 2-M, 9-C; Adjacent to Site 10-C

Table 3-5 (continued)
Plant Species Occurring within Conservation Areas, Movement Corridors, and
Adjacent Lands of the Maricopa Sun Solar Complex
 (Source: Quad Knopf 2010a, 2010c)

Family Name	Scientific Name	Common Name	Project Site
Geraniaceae	<i>Erodium</i> sp.	Filaree	Occurring on Site 9-C; Adjacent to Site 9-C
	<i>Cynodon dactylon</i>	Bermuda grass	Occurring on Site 1-C
	<i>Distichlis spicata</i>	Saltgrass	Occurring on Sites 3-C, 3-C2, 3-M
	<i>Schismus</i> sp.	Mediterranean barley	Occurring on Sites 2-M, 3-S, 3-C, 3-C2, 3-M, 9-C; Adjacent to Site 9-C
Rosaceae	<i>Prunus dulcis</i>	Almond	Adjacent to Site 5-S
Salicaceae	<i>Salix laevigata</i>	Red willow	Adjacent to Site 15-S
	<i>Salix goodingii</i>	Black willow	Adjacent to Site 15-S
	<i>Salix</i> sp.	Willow	Occurring on Site 2-S, 2-M
Solanaceae	<i>Datura wrightii</i>	Jimsonweed	Occurring on Site 5-S; Adjacent to Site 9-C
	<i>Nicotiana glauca</i>	Tree tobacco	Adjacent to Site 10-C
Tamaricaceae	<i>Tamarix chinensis</i>	Tamarisk	Occurring on Sites 1-C, 2-S, 2-M, 3-S, 3-C, 3-C2, 3-M, 15-S, 17-C; Adjacent to Sites 9-C, 10-C, 15-S
Typhaceae	<i>Typha latifolia</i>	Narrowleaf cattail	Adjacent to Site 15-S

General wildlife observed in 2009, 2010, and 2012 (Quad Knopf 2010c, 2010d, 2012) (Appendix G) during visual surveys, small mammal trapping studies, focused surveys for the San Joaquin kit fox, and focused surveys for blunt-nosed leopard lizard (*Gambelia sila*) in and surrounding the Permit Area includes coyote (*Canis latrans*), California ground squirrel (*Spermophilus beecheyi*), desert cottontail (*Sylvilagus audubonii*), black-tailed jack rabbit (*Lepus californicus*), deer mouse (*Peromyscus maniculatus*), Heermann's kangaroo rat (*Dipodomys heermanni*), barn owl (*Tyto alba*), red-tailed hawk (*Buteo jamaicensis*), lesser nighthawk (*Chordeiles acutipennis*), American kestrel (*Falco sparverius*), greater roadrunner (*Geococcyx californianus*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), California horned lark (*Eremophila alpestris actia*), northern mockingbird (*Mimus polyglottos*), mourning dove (*Zenaida macroura*), California whiptail (*Aspidoscelis tigris munda*), common side-blotched lizard (*Uta stansburiana*), and western toad (*Anaxyrus boreas*). Specific site occurrence information for these species is provided in Table 3-6.

Table 3-6
Wildlife Species Occurring on Permit Area Lands and
Lands Adjacent to the Maricopa Sun Solar Complex
 (Source: Quad Knopf 2010a)

Scientific Name	Common Name	Project Site
Amphibians		
<i>Anaxyrus sp. or Spea sp.</i>	toad	Sites 3-S, 3-M, 3-C, 3-C2,
Reptiles		
<i>Aspidoscelis tigris munda</i>	California whiptail	Sites 3-S, 3-M, 3-C, 3-C2,
<i>Crotalus oreganus</i>	western rattlesnake	Site 15-S
<i>Gambelia sila</i>	blunt-nosed leopard lizard	Adjacent to Sites 2-S, 2-M, 3-S, 3-M, 3-C, 3-C2, 17-C
<i>Phrynosoma blainvillii</i>	California horned lizard	Adjacent to Sites 3-S, 3-M, 3-C, 3-C2,
<i>Uta stansburiana</i>	common side-blotched lizard	Sites 3-S, 3-M, 3-C, 3-C2, 15-S
Birds		
<i>Athene cunicularia</i>	western burrowing owl	Sites 3-S, 3-C2, 6-S, 7-S, 9-C; Adjacent to Sites 1-C, 2-S, 2-M, 3-C, 5-S, 10-C, 15-S
<i>Buteo swainsoni</i>	Swainson's hawk	Adjacent to Sites 4-S, 4-M
<i>Chordeiles acutipennis</i>	Lesser nighthawk	Site 15-S
<i>Circus cyaneus</i>	northern harrier	Site 15-S, Adjacent to Sites 1-C, 3-S, 3-M, 3-C, 3-C2, 4-S, 4-M, 6-S
<i>Corvus corax</i>	raven	Sites 1-C, 2-S, 2-M, 15-S
<i>Corvus brachyrhynchos</i>	crow	Site 15-S
<i>Elanus leucurus</i>	white-tailed kite	Site 5-S
<i>Eremophila alpestris actia</i>	California horned lark	Site 15-S
<i>Falco sparverius</i>	American kestrel	Site 15-S
<i>Lanius ludovicianus</i>	loggerhead shrike	Site 17-C
<i>Tyto alba</i>	barn owl	Sites 3-S, 3-M, 3-C-3, 3-C2, 5-S, 15-S
<i>Zenaida macroura</i>	mourning dove	Site 15-S
Mammals		
<i>Ammospermophilus nelsoni</i>	Nelson's antelope squirrel	Site 9-C; Adjacent to Sites 1-C, 10-C, 17-C
<i>Spermophilus beecheyi</i>	California ground squirrel	Site 15-S
<i>Peromyscus maniculatus</i>	deer mouse	Sites 1-C, 2-S, 2-M, 3-S, 3-M, 3-C, 3-C2, 9, 10, 15-S
<i>Dipodomys nitratoides nitratoides</i>	Tipton kangaroo rat	Sites 1-C, 9-C; Adjacent to Sites 2-S, 2-M, 3-S, 3-M, 3-C, 3-C2, 10-C
<i>Dipodomys heermanni</i>	Heermann's kangaroo rat	Sites 1-C, 9-C; Adjacent to Sites 2-S, 2-M, 3-S, 3-C, 3-C2, 3M, 10-C
<i>Onychomys torridus tularensis</i>	Tulare grasshopper mouse	Sites 1-C, 6-S, 9-C, 15-S
<i>Lepus californicus</i>	black-tailed jackrabbit	Sites 1-C, 2-S, 2-M, 3-S, 3-M, 3-C, 3-C2, 4-S, 4-M, 7-S, 7-M, 15-S
<i>Sylvilagus audubonii</i>	cottontail	Sites 1-C, 2-S, 2-M, 3-S, 3-M, 3-C, 3-C2, 4-S, 4-M, 7-S, 7-M, 15-S
<i>Felis catus</i>	house cat	Site 6-S
<i>Taxidea taxus</i>	American badger	Site 17-C
Canidae	unknown canid	Site 15-S
<i>Canis familiaris</i>	domestic dog	Sites 7-S, 7-M, 15-S
<i>Canis latrans</i>	coyote	Sites 1-C, 3-S, 3-M, 3-C, 3-C2, 5-S, 15-S
<i>Vulpes macrotis mutica</i>	San Joaquin kit fox	Adjacent to Sites 1-C, 15-S, 17-C

A search of existing databases and literature was conducted to determine sensitive biological resources occurring in the Project region. Information was obtained from the California Natural Diversity Database (CNDDDB) (CDFG 2009), California Native Plant Society Inventory of Rare and Endangered Plants (CNPS 2009), Recovery Plan for the Upland Species of San Joaquin Valley, California (USFWS 1998), and the Federal Endangered and Threatened Species List (USFWS 2009). Five sensitive natural communities, twenty special status plant species (Table 3-7), and thirty-nine special status wildlife species (Table 3-8) are known to occur within the Project region. The distributions of these species in the Project region, based upon records available from the CNDDDB, are provided in Figures 3-5A-D. Detailed descriptions of the determination of special-status species to be covered under the MSHCP are provided below. Special-status species that are determined to be present or to become present on the Permit Area and for which take is authorized under the MSHCP are referred to as “Covered Species.” Further details on the criteria for determining Covered Species are provided below.

There are CNDDDB records within a five-mile radius of the Permit Area for the following special status wildlife species.

- Blunt-nosed leopard lizards (*Gambelia sila*)
- San Joaquin kit foxes (*Vulpes macrotis mutica*)
- Tipton kangaroo rats (*Dipodomys nitratooides nitratooides*)
- Buena Vista Lake shrews (*Sorex ornatus relictus*)
- Nelson’s antelope squirrels (*Ammospermophilus nelsoni*)
- American badgers (*Taxidea taxus*)
- Western burrowing owls (*Athene cunicularia*)

Quad Knopf found no CNDDDB records indicating that the California horned lizards (*Phrynosoma blainvillii*), Swainson’s hawks (*Buteo swainsoni*), white-tailed kites (*Elanus leucurus*), California horned larks (*Eremophila alpestris actia*), or northern harriers (*Circus cyaneus*) occur within a five-mile radius of the Project sites, although these special status species were observed during the 2009, 2010 and 2012 studies conducted on the project sites (Quad Knopf 2010c 2012) (Appendix G). Special-status wildlife species are generally not present on the Solar Sites, but primarily exist in scattered, isolated populations within the southern San Joaquin Valley, particularly north and east of the California Aqueduct where the Project is primarily located. The special-status species observed either on the Permit Area or on adjacent lands include the blunt-nosed leopard lizard, San Joaquin kit fox, Tipton kangaroo rat, Nelson’s antelope ground squirrel, western burrowing owl, and American badger (see Table 3-6 and Appendix B).

Table 3-7
Sensitive Vegetation Communities and Special Status Plant Species
Occurring in the Region of the Maricopa Sun Solar Habitat Conservation Plan Area
 (Source: CDFG 2009, CNPS 2009, and USFWS 2009)

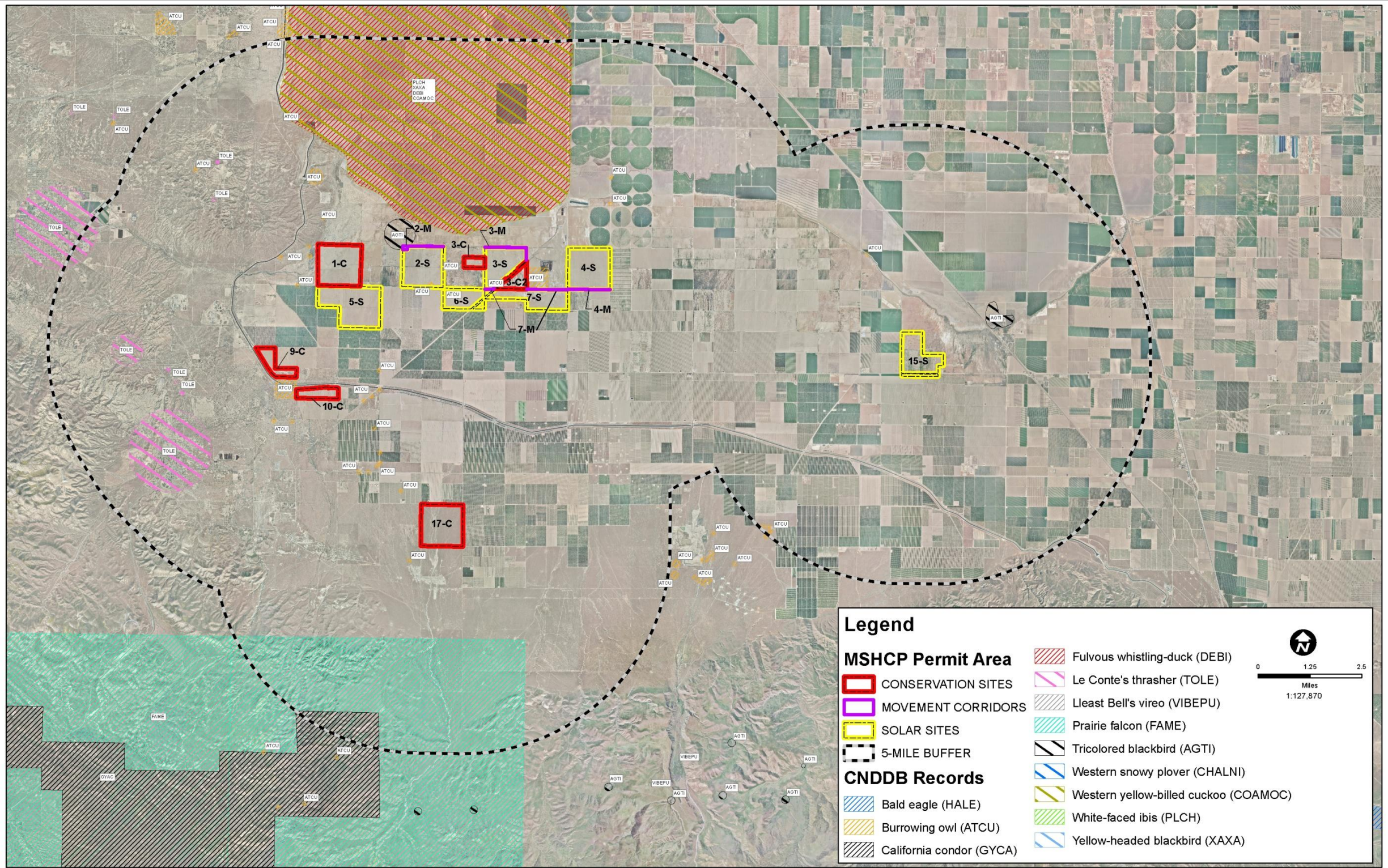
Scientific Name	Common Name	Status
Sensitive vegetative communities		
Great Valley Cottonwood Riparian Forest	Great Valley Cottonwood Riparian Forest	Protected under CEQA
Great Valley Mesquite Scrub	Great Valley Mesquite Scrub	Protected under CEQA
Valley Sacaton Grassland	Valley Sacaton Grassland	Protected under CEQA
Valley Saltbush Scrub	Valley Saltbush Scrub	Protected under CEQA
Valley Sink Scrub	Valley Sink Scrub	Protected under CEQA
Plants		
<i>Allium howellii</i> var. <i>clokeyi</i>	Mt. Pinos onion	1B.3
<i>Astragalus hornii</i> var. <i>hornii</i>	Horn's milk-vetch	1B.1
<i>Atriplex cordulata</i>	heartscale	1B.2
<i>Atriplex tularensis</i>	Bakersfield smallscale	CE, 1B.1
<i>Atriplex coronata</i> var. <i>vallicola</i>	Lost Hills crownscale	1B.2
California (<i>Erodium</i>) <i>macrophyllum</i>	round-leaved filaree	1B.1
<i>Caulanthus californicus</i> (<i>Stanfordia californica</i>)	California jewel-flower	FE, CE, 1B.1
<i>Caulanthus coulteri</i> var. <i>lemmonii</i>	Lemmon's jewelflower	1B.2
<i>Cirsium crassicaule</i>	slough thistle	1B.1
<i>Cordylanthus mollis</i> ssp. <i>hispidus</i>	Hispid bird's beak	1B.1
<i>Delphinium recurvatum</i>	recurved larkspur	1B.2
<i>Eremalche kernensis</i>	Kern mallow	FE, 1B.1
<i>Eriastrum hooveri</i>	Hoover's eriastrum	4.2
<i>Eschscholzia lemmonii</i> ssp. <i>kernensis</i>	Tejon poppy	1B.1
<i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	Coulter's goldfields	1B.1
<i>Layia heterotricha</i>	oale-yellow layia	1B.1
<i>Layia leucopappa</i>	Comanche Point layia	1B.1
<i>Monardella linoides</i> ssp. <i>oblonga</i>	Tehachapi monardella	1B.3
<i>Monolopia congdonii</i>	San Joaquin woollythreads	FE, 1B.2
<i>Stylocline citroleum</i>	oil neststraw	1B.1

Status Definitions

FE	Federally Endangered
CE	California Endangered
1B.1	California Native Plant Society List 1B Species-Plants Categorized as Rare, Threatened, or Endangered in California and Elsewhere; Seriously Endangered in California
1B.2	California Native Plant Society List 1B Species-Plants Categorized as Rare, Threatened, or Endangered in California and Elsewhere; Fairly Endangered in California.
1B.3	California Native Plant Society List 1B Species-Plants Categorized as Rare, Threatened, or Endangered in California and Elsewhere; Not Very Endangered in California
4.2.	Plants of limited distribution - Watch list, Fairly endangered in California (20-80% occurrences threatened)

Table 3-8
Special Status Wildlife Species
Occurring in the Region of the Maricopa Sun Solar Habitat Conservation Plan Area
 (Source: CDFG 2009, CNPS 2009, and USFWS 2009)

Scientific Name	Common Name	Status
Invertebrates		
<i>Branchinecta lynchi</i>	vernal pool fairy shrimp	FT
<i>Desmocerus californicus dimorphus</i>	Valley elderberry longhorn beetle	FT
<i>Euproserpinus euterpe</i>	Kern primrose sphinx moth	FT
Fishes		
<i>Hypomesus transpacificus</i>	Delta smelt	FT, CT
Amphibians		
<i>Rana aurora draytonii</i>	California red-legged frog	FT
<i>Spea hammondi</i>	western spadefoot	CSC
Reptiles		
<i>Actinemys marmorata pallida</i>	western pond turtle	CSC
<i>Anniella pulchra pulchra</i>	silvery legless lizard	CSC
<i>Gambelia sila</i>	blunt-nosed leopard lizard	CE, FE, CDFW fully protected
<i>Masticophis flagellum ruddocki</i>	San Joaquin whipsnake	CSC
<i>Phrynosoma blainvillii</i>	California horned lizard	CSC
<i>Thamnophis gigas</i>	giant garter snake	FT, CT
Birds		
<i>Agelaius tricolor</i>	tricolored blackbird	CSC
<i>Athene cunicularia</i>	western burrowing owl	CSC
<i>Buteo swainsoni</i>	Swainson's hawk	CSC
<i>Charadrius alexandrinus nivosus</i>	western snowy plover	FT
<i>Charadrius montanus</i>	mountain plover	CSC
<i>Circus cayaneus</i>	northern harrier	CSC
<i>Coccyzus americanus occidentalis</i>	western yellow-billed cuckoo	CE
<i>Dendrocygna bicolor</i>	fulvous whistling-duck	CSC
<i>Elanus leucurus</i>	white-tailed kite	CDFW fully protected
<i>Eremophila alpestris actia</i>	California horned lark	CDFW watch list
<i>Falco mexicanus</i>	prairie falcon	CDFW watch list
<i>Gymnogyps californianus</i>	California condor	FE, CE
<i>Lanius ludovicianus</i>	loggerhead shrike	CDFW watch list
<i>Plegadis chihi</i>	white-faced ibis	CDFW watch list
<i>Toxostoma lecontei</i>	Le Conte's thrasher	CSC
<i>Xanthocephalus xanthocephalus</i>	yellow-headed blackbird	CSC
Mammals		
<i>Ammospermophilus nelsoni</i>	Nelson's antelope squirrel	CT
<i>Dipodomys ingens</i>	giant kangaroo rat	FE, CE
<i>Dipodomys nitratoides brevinasus</i>	short-nosed kangaroo rat	CSC
<i>Dipodomys nitratoides nitratoides</i>	Tipton kangaroo rat	FE, CE
<i>Eumops perotis californicus</i>	western mastiff bat	CSC
<i>Onychomys torridus tularensis</i>	Tulare grasshopper mouse	CSC
<i>Perognathus inornatus inornatus</i>	San Joaquin pocket mouse	CSC, BLMS
<i>Sorex ornatus relictus</i>	Buena Vista Lake shrew	FE
<i>Taxidea taxus</i>	American badger	CSC
<i>Vulpes macrotis mutica</i>	San Joaquin kit fox	FE, CT

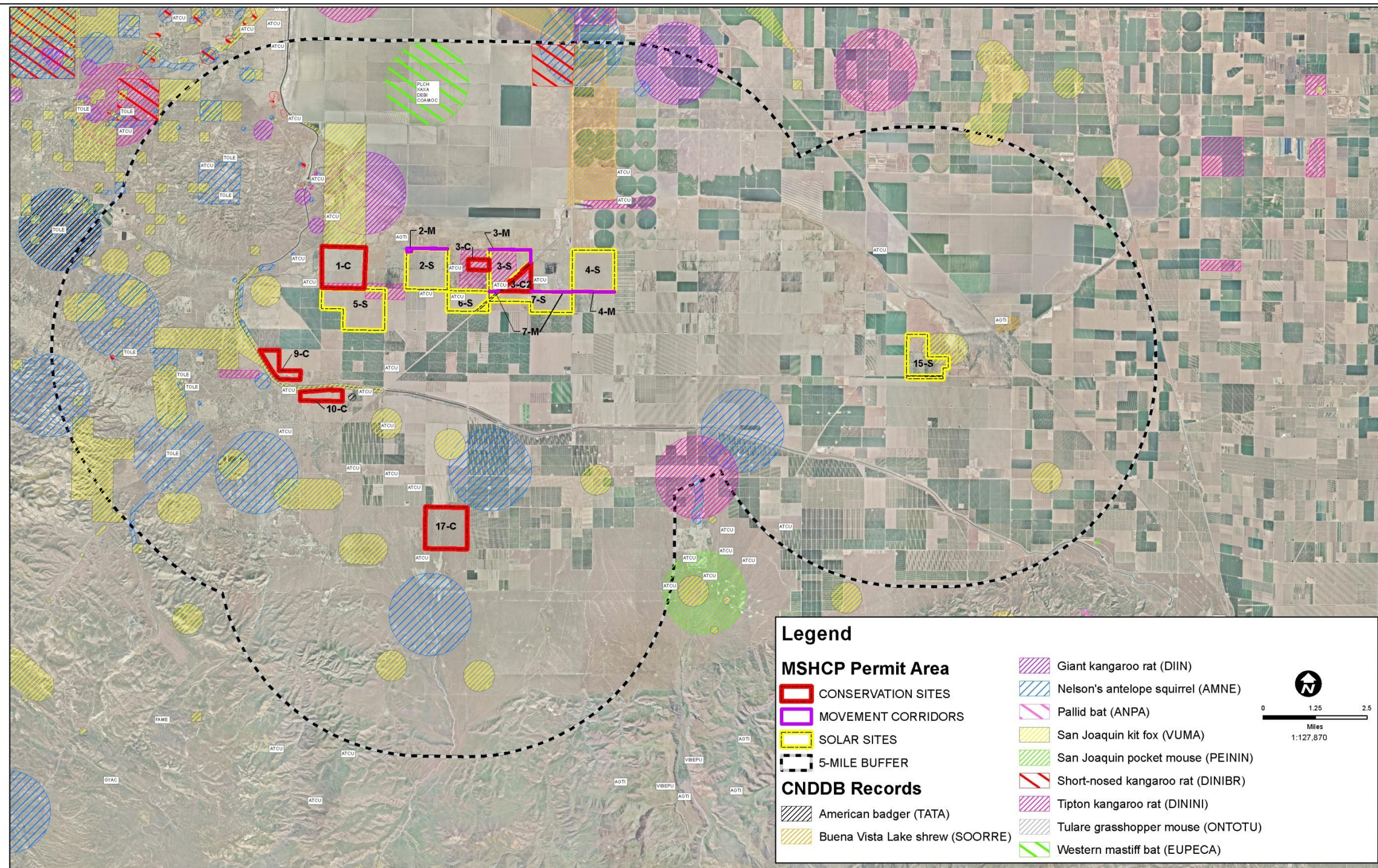


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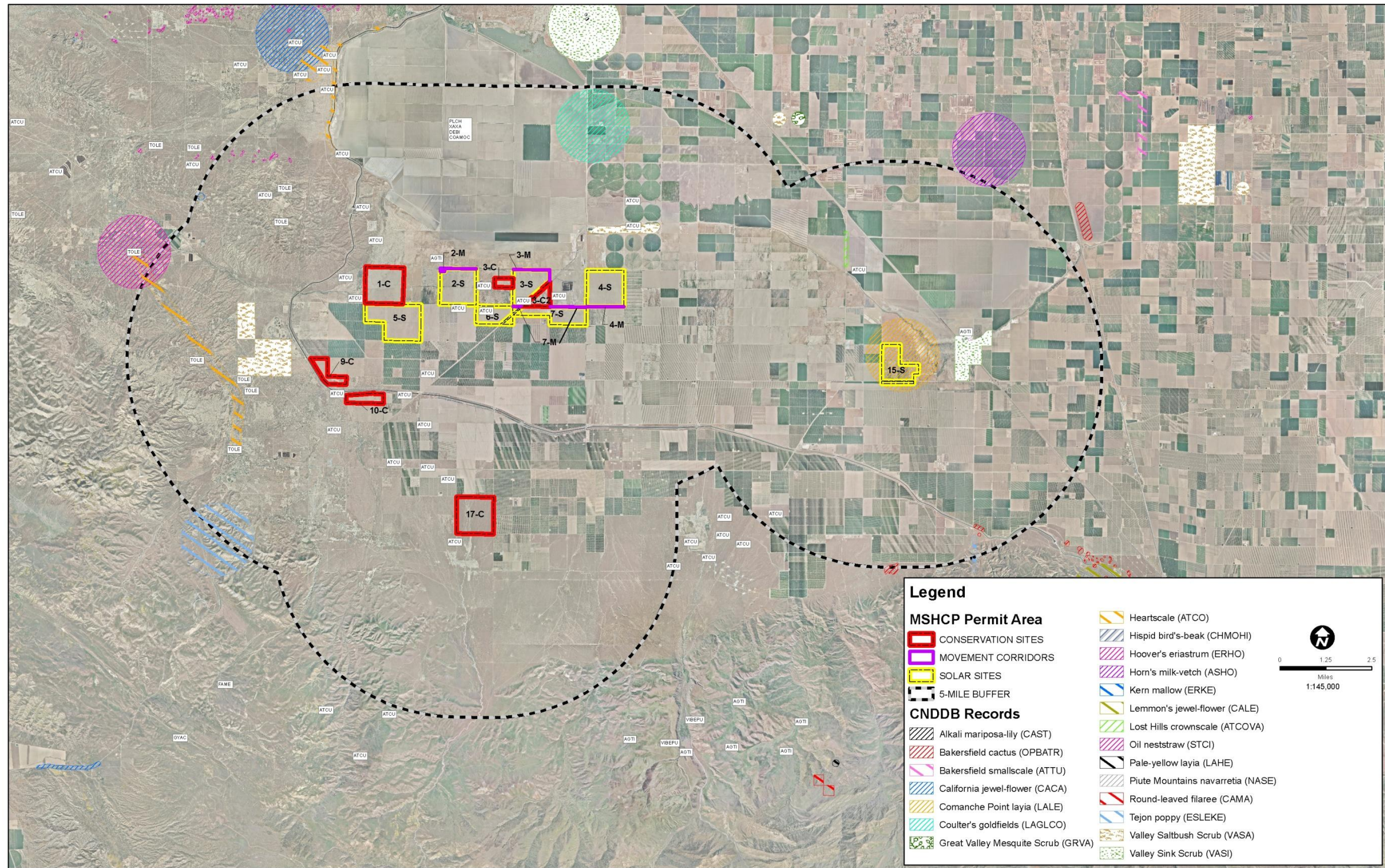
CALIFORNIA NATURAL DIVERSITY DATABASE (CNDDDB) SENSITIVE AVIAN SPECIES OBSERVATIONS,
MARICOPA SUN SOLAR COMPLEX, KERN COUNTY, CALIFORNIA

Figure
3 - 5A



CALIFORNIA NATURAL DIVERSITY DATABASE (CNDDDB) SENSITIVE MAMMAL SPECIES OBSERVATIONS,
MARICOPA SUN SOLAR COMPLEX, KERN COUNTY, CALIFORNIA

Figure
3 - 5B

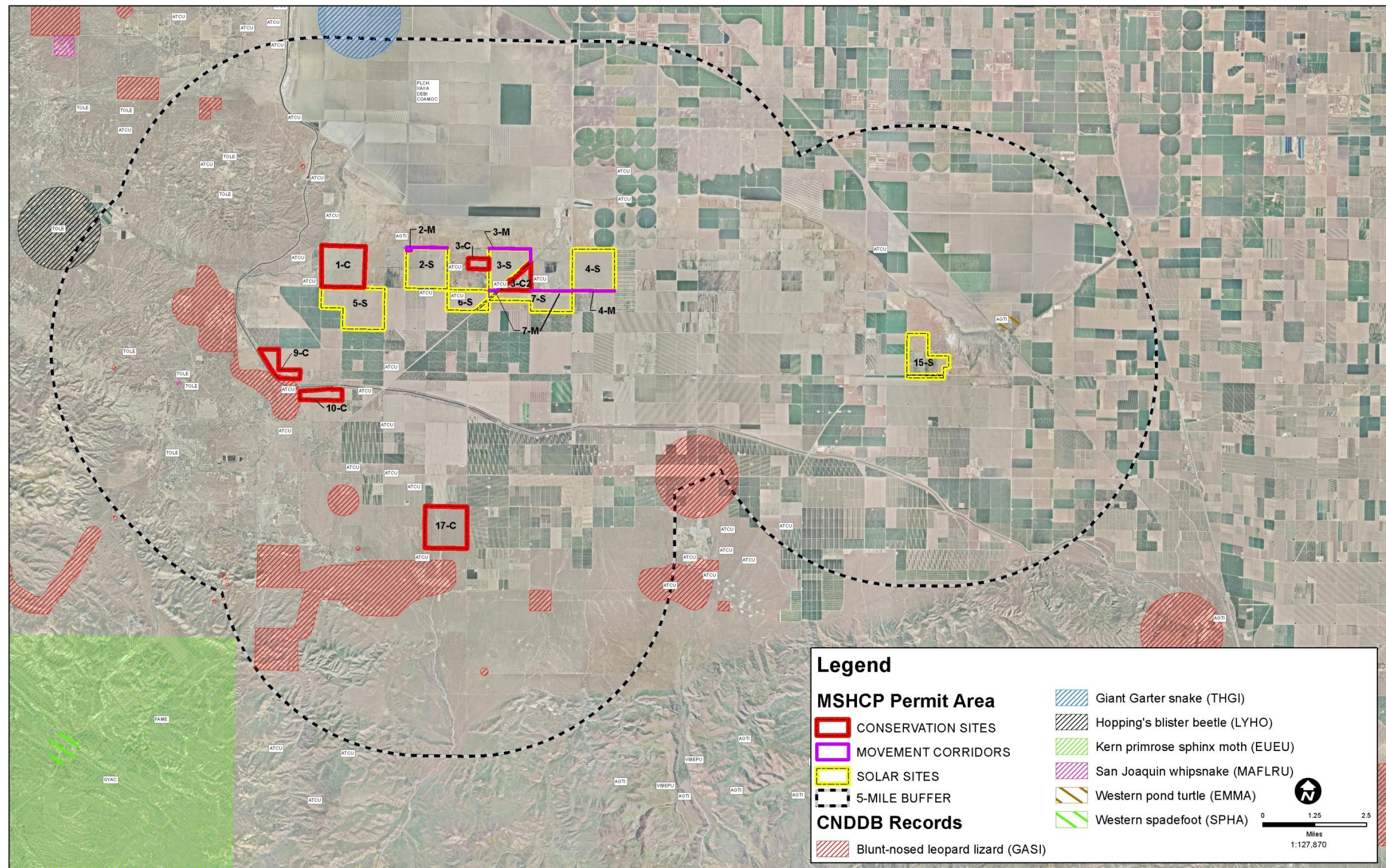


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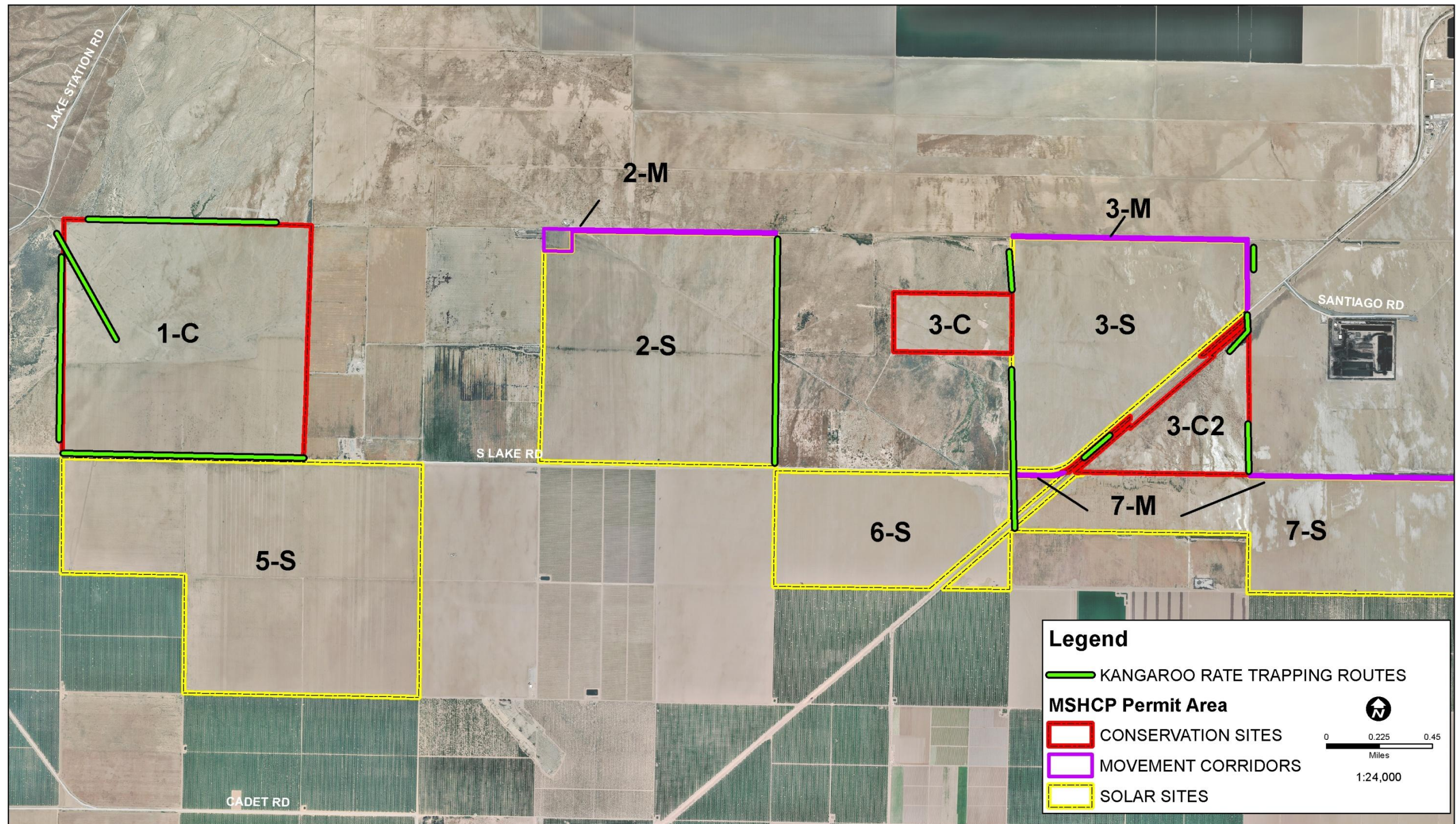
CALIFORNIA NATURAL DIVERSITY DATABASE (CNDDDB) SENSITIVE PLANT SPECIES OBSERVATIONS,
MARICOPA SUN SOLAR COMPLEX, KERN COUNTY, CALIFORNIA

Figure
3 - 5C



An evaluation of the potential for each sensitive natural community and special status plant and animal species is provided below for each site and adjacent lands. The evaluation is based upon extensive site investigations, including:

- Reconnaissance-level “windshield” surveys conducted in 2009 and 2010 (Quad Knopf, 2009; Quad Knopf 2010c) on Sites 1-C, 2-S, 3-C, 3-C2, 3-S, 4-S, 5-S, 6-S, 7-S, and 15-S;
- A reconnaissance-level transect survey was conducted on Site 17-C in 2009 (Quad Knopf 2009) consisting of four, north-south, one-mile-long meandering transects. The four transects were nearly equally spaced across the site and resulted in approximately 25 percent visual coverage of the area;
- Focused surveys were conducted in 2009, 2010, and 2012 (Quad Knopf 2012) (Appendix G) on the various sites including:
 - Pedestrian transect surveys conducted on each Solar Site (Sites 2-S, 3-S, 4-S, 5-S, 6-S, 7-S, and 15-S) and on five of the six Conservation Sites (1-C, 3-C, 3-C2, 9-C, and 10-C), with transects spaced at 100-foot intervals;
 - Protocol-level small mammal trapping (100 traps per linear mile, set and checked for three to four consecutive nights) within the Permit Area and on adjacent lands containing small mammal burrows (Figures 3-6A-B). Trapping was conducted on Sites 1-C, 2-S, 3-C2, within the native habitat occurring on Site 9-C, on lands adjacent to the eastern edge of Site 2-S, on lands adjacent to the western side of Site 3-S, on lands adjacent to the north and west sides of Site 10-C, lands to the south of Site 10-C, and lands adjacent to the eastern side of Site 15-S;
 - Protocol-level blunt-nosed leopard lizard surveys (12 days of surveys between April 15 and July 15 and five survey days between August 15 and September 15) conducted within suitable habitat (Figures 3-7A-B). Surveys were conducted on lands adjacent (within 500 feet) to the north and west sides of Site 1-C, on the lands adjacent to the east of Site 2-S to the lands adjacent to the west side of Site 3-S, on the lands adjacent to the east side of Site 15-S, on Site 3-C2, within the 83.25 acres of native habitat occurring on Site 9-C, on the lands adjacent to the west of Site 9-C, and on lands adjacent to the north and west sides of Site 10-C, and on lands south of Site 10-C;
 - Protocol-level San Joaquin kit fox surveys consisting of searches for potential dens, night spotlighting around each site, and monitoring track stations equipped with cameras with infra-red and motion sensitive triggers (generally, with one station established in each corner and the center of each site) (Figure 3-8); and
 - Raptor nest surveys consisting of identifying any stands of trees and manmade structures (such as transmission towers) that would provide suitable nesting habitat for raptors, and recording any raptors or potential raptor nests within all Solar Sites, within all Conservation Sites, and within 0.5 miles of the Permit Area.

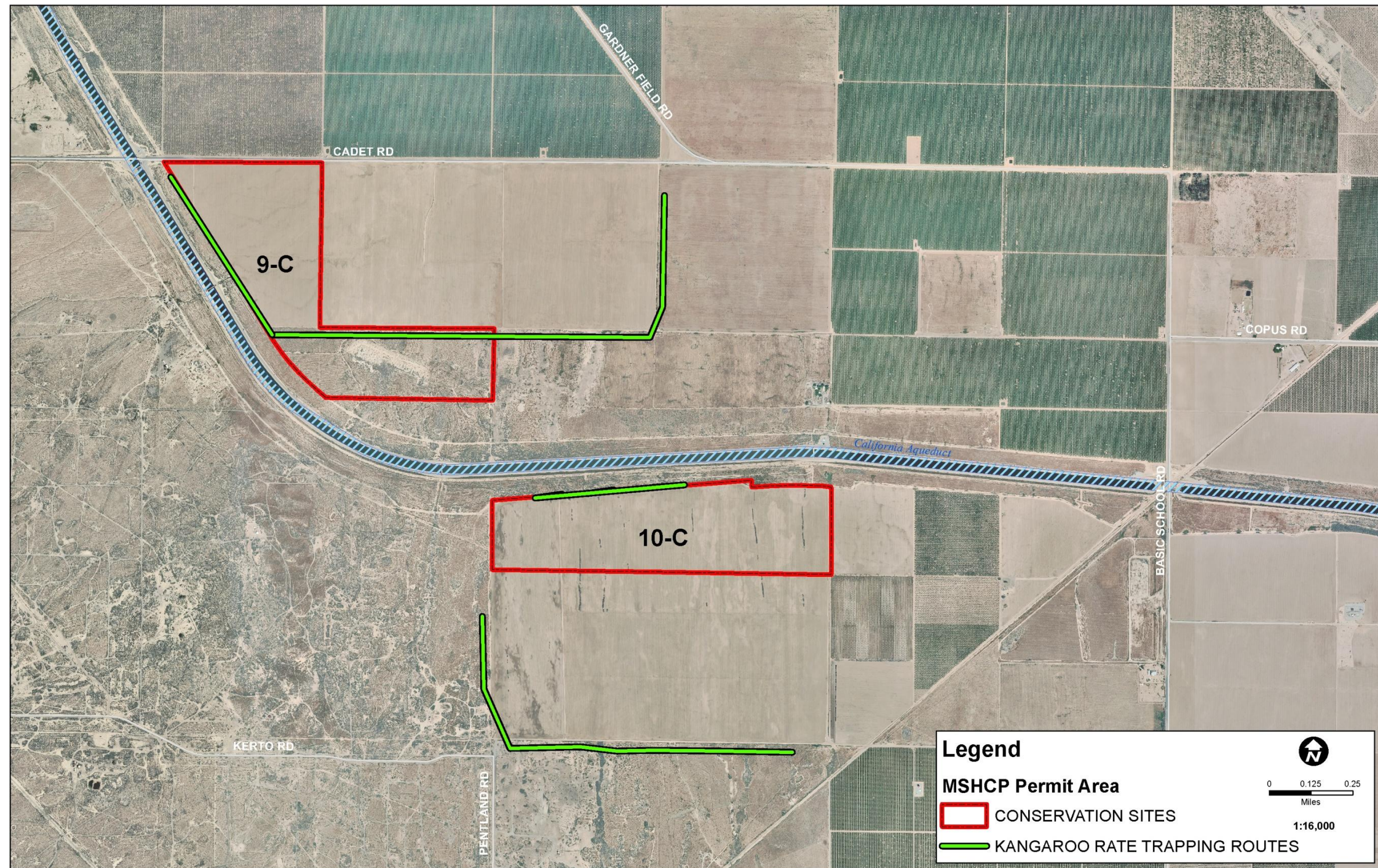


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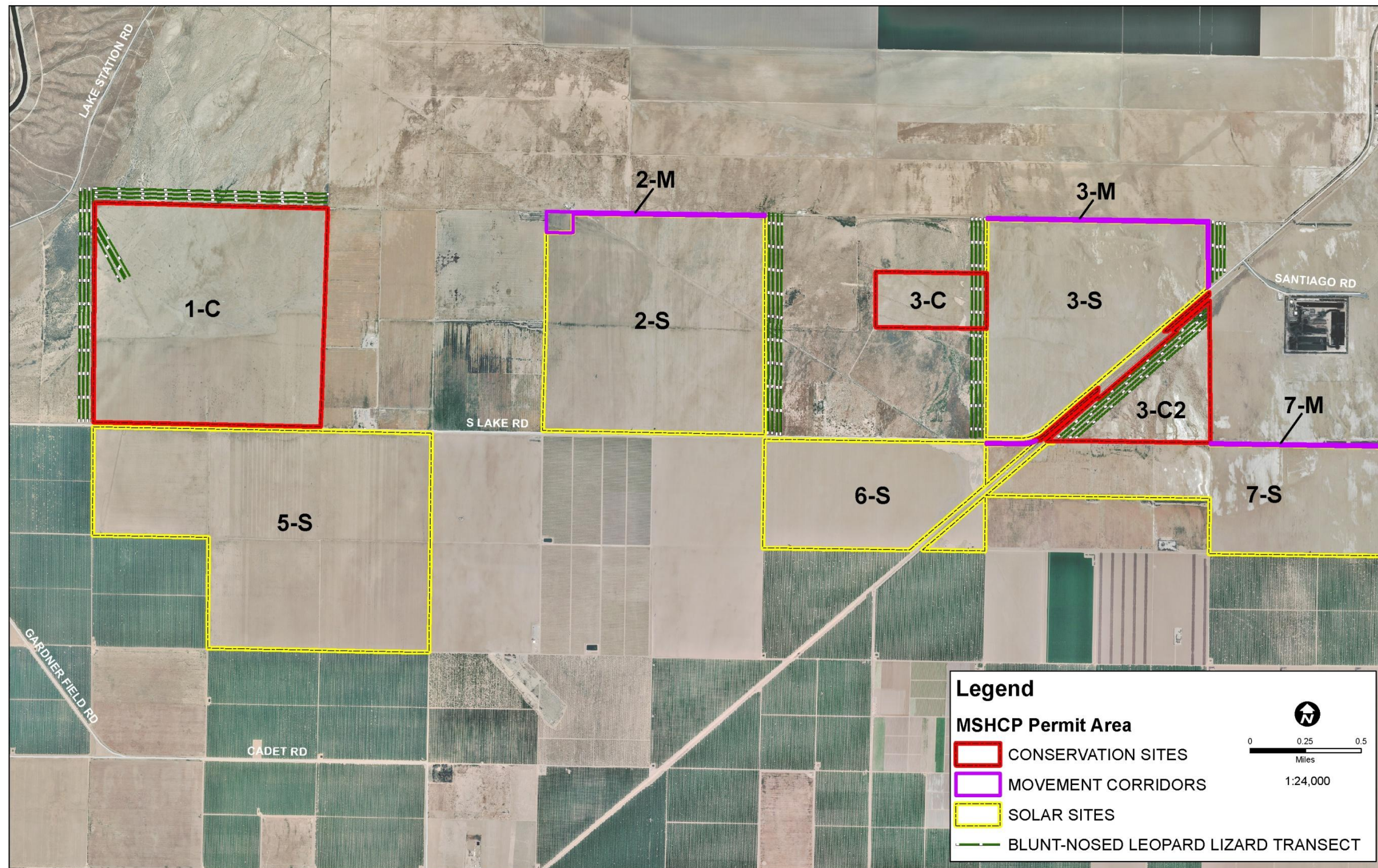
SMALL MAMMAL TRAPPING LINES, MARICOPA SUN SOLAR COMPLEX, KERN COUNTY, CALIFORNIA

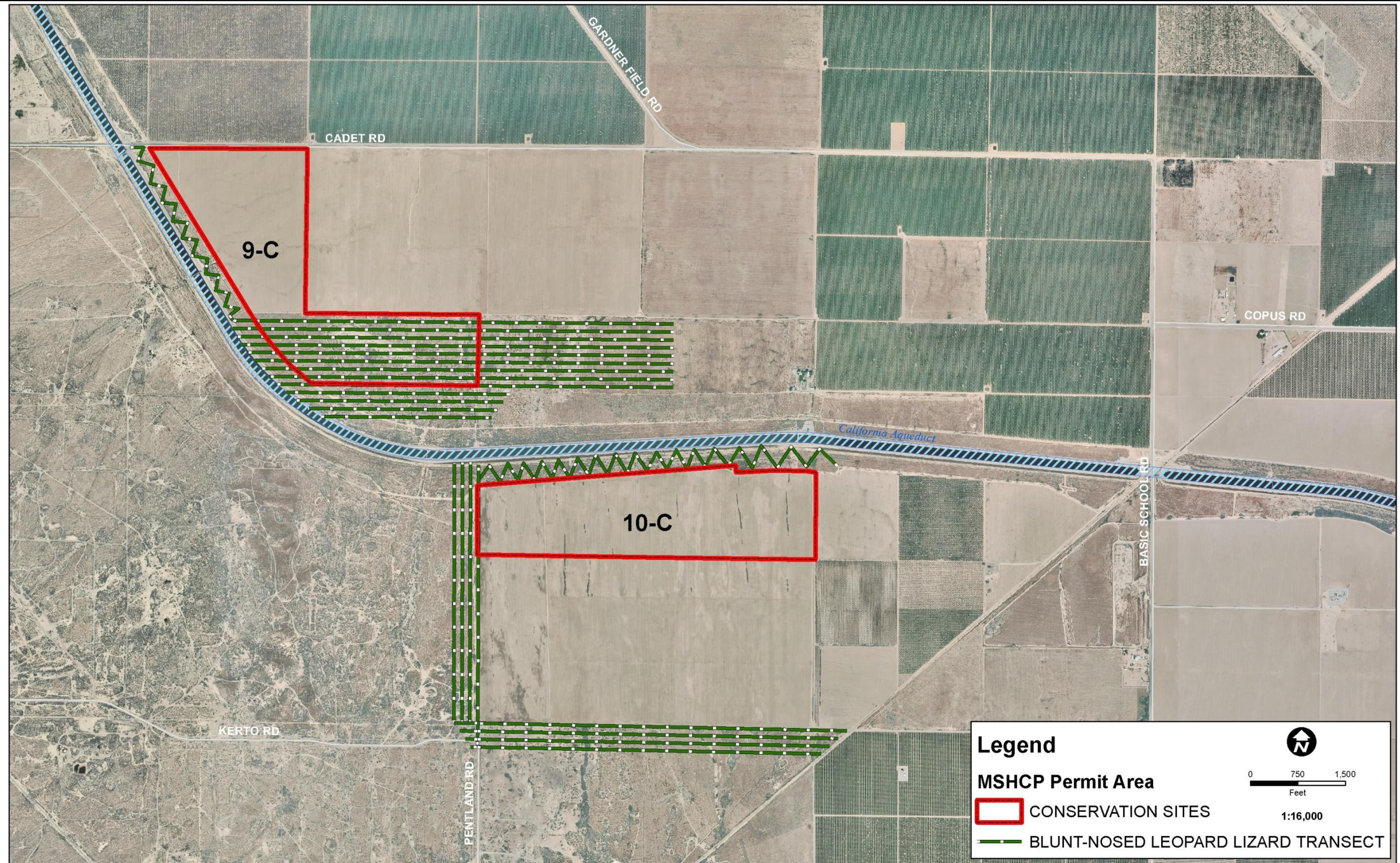
Figure
3 – 6A



SMALL MAMMAL TRAPPING LINES,
MARICOPA SUN SOLAR COMPLEX, KERN COUNTY, CALIFORNIA

Figure
3 - 6B



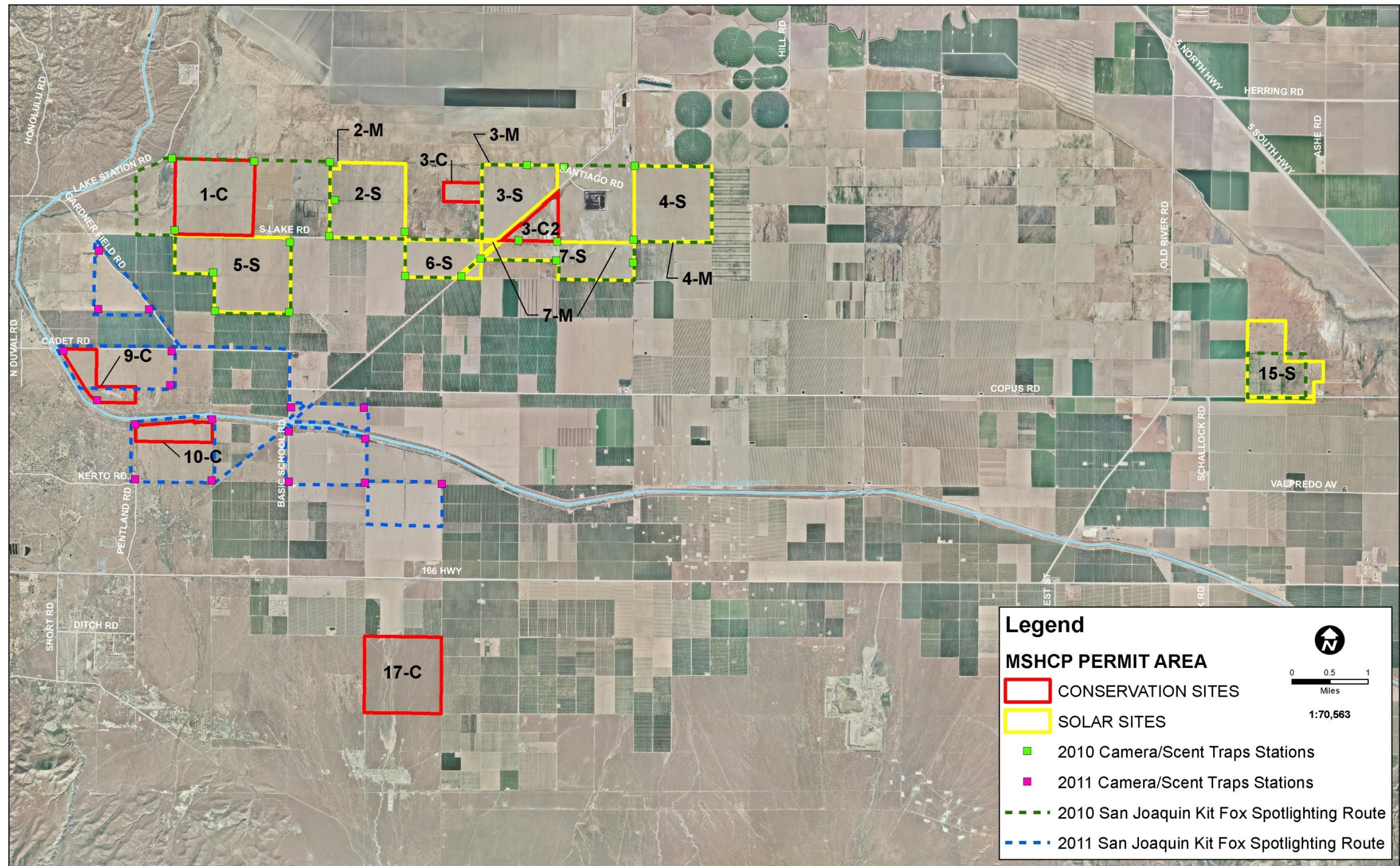


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BLUNT-NOSED LEOPARD LIZARD TRANSECT, MARICOPA SUN SOLAR COMPLEX, KERN COUNTY, CALIFORNIA

Figure
3 – 7B



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SAN JOAQUIN KIT FOX SPOTLIGHTING, MARICOPA SUN SOLAR COMPLEX, KERN COUNTY, CALIFORNIA

Figure
3 – 8

The following site-by-site descriptions of the Permit Area include information on land use, sensitive natural communities, general vegetation occurrence, and general and special status plant and wildlife species occurrence.

Solar Sites (3,798.2 acres)

The Solar Sites (described in Section 2.2, illustrated on Figure 1-2), including the Movement Corridors, formerly supported agricultural uses; these sites encompass 3,798.2 acres. Due to the lack of available water, the land owners ceased agriculture production more than 8 years ago; however, the land has been kept in a farm-ready condition by repeated disking to control weeds. The Solar Sites are currently not fenced or actively improved.

Site 2-S (628.8 acres)

The site has been disked for weed control on a biannual basis, except for the sides of an earthen berm located along the northern edge of the site. The site is mostly bare ground with occasional weedy annual plants that include salt heliotrope (*Heliotropium curassavicum*), tamarisk, red brome (*Bromus madritensis rubens*), fiddleneck (*Amsinckia menziesii*), Mediterranean barley (*Hordeum murinum*), quailbush, and seepweed. A lone willow tree, which appears to be a black willow/weeping willow hybrid (*Salix gooddingii* and *S. babylonica*), exists near the electrical transmission lines in the southeast quarter of the site. Most of the annual plants occur along the earthen berm located at the north end of the site. Scattered seepweed shrubs are on the sides of the berm along the northern portion of the project site, but these scattered shrubs do not comprise a functional Valley Sink Scrub community. The surrounding lands consist of vineyards, an alfalfa (*Medicago sativa*) field, and disked fields. To the east of this site is native Saltbush Scrub habitat, which has had past disturbance by disking. This area is vegetated with disturbed chenopod scrubland, seepweed, Allscale saltbush, Mediterranean grass (*Schismus arabicus*), red brome, fiddleneck, alkali goldenbush (*Isocoma acradenia*) and a few large tamarisks.

Site 2-S was likely to have been historically vegetated with a matrix of Valley Saltbush Scrub and Alkali Sink Scrub vegetation communities. However, the site is not currently vegetated and is managed by repeated disking, which has eliminated all but the occasional plant. There are no historical records of special status plant or wildlife species occurring on the site (See Figures 3-5A-D), and habitat that would support special status species does not occur (Quad Knopf 2010c). Similarly, due to the high level of disturbance, it is unlikely but possible that special status species including heartscale (*Atriplex cordulata*), Lost Hills crown scale (*Atriplex coronata* var. *vallicola*), recurved larkspur (*Delphinium recurvatum*), Kern mallow (*Eremalche kernensis*), Hoover's eriastrum (*Eriastrum hooveri*), Tejon poppy (*Eschscholzia lemmonii* ssp. *Kernensis*), San Joaquin woollythreads (*Monolopia congdonii*), and/or oil neststraw (*Stylocline citroleum*) might occur within native saltbush scrub habitat that exists on adjacent lands to the east of Site 2-S.

Quad Knopf found no historic records indicating the occurrence of sensitive wildlife species on the project site (See Figures 3-5A-D) and no evidence could be found that Covered Species occupy this site (Table 3-9) (Appendix B). However, the San Joaquin kit fox and western burrowing owl may occasionally make forays onto and across the project site for foraging or movement purposes. Blunt-nosed leopard lizards, western burrowing owls, and Tipton kangaroo

rats were observed on adjacent land to the east of Site 2-S (Appendix B). The Tipton kangaroo rat and the blunt-nosed leopard lizard may forage onto Site 2-S and thus be subject to impacts from project construction, operations and maintenance, and decommissioning. To minimize impacts, barrier fencing (See Figure 2-4) will be installed along the edges of this site where these species occur or may occur, thus reducing the potential for take. Several dens located on adjacent lands are of the size and configuration that would qualify as potential San Joaquin kit fox and American badger dens, although diagnostic sign of these species was not present. Other special status species (e.g., western mastiff bat, white-tailed kite) may overfly the project site from time to time.

Table 3-9
Existing Solar Site Conditions and Presence of Covered Species,
Maricopa Sun Solar Complex

Site No.	Area (Acres)	Site Condition/Vegetation	Presence of Covered Species*
2-S	628.8	Fallow farmland, actively disked for weed control, minimal vegetation present	None present, but SJKF and WEBO may be transients; BNLL, TKR, and WEBO known to occur nearby
3-S	460.4	Fallow farmland, actively disked for weed control, minimal vegetation present; NWI mapped freshwater emergent wetlands; field surveys determined that the area lacks hydric soils or wetland vegetation	WEBO was sighted on this site, SJKF may be transients; BNLL, TKR, and WEBO known to occur nearby
4-S	652.5	Fallow farmland, actively disked for weed control, no vegetation present; a ponding basin is located on lands off site, adjacent to the southwest corner of this site	None present; SJKF and WEBO may be transients
5-S	797.2	Fallow farmland, actively disked for weed control, minimal vegetation present	None present; SJKF and WEBO may be transients
6-S	304.2	Fallow farmland, actively disked for weed control, minimal vegetation present	WEBO observed on site; SJKF may occur as transient; TKR and BNLL not present
7-S	471.6	Fallow farmland, actively disked for weed control, minimal vegetation present; NWI mapped emergent wetlands in the north central portion no longer present; a small (3.88-acre) ponding basin is present, off site, at the south corner	WEBO observed on site; SJKF may occur as transient; TKR and BNLL not present on site, but present on adjacent lands to the north; Covered Species may be present within existing easements, but no evidence of presence was obtained and those areas are not within the Solar Development Footprint
15-S	483.6	Fallow farmland, actively disked for weed control, minimal vegetation present; several NWI mapped wetlands are no longer present due to frequent disking	None present; WEBO, SJKF observed on adjacent lands and are expected to be present as transients on the site; TKR may also occur on adjacent lands.

* SJKF = San Joaquin kit fox; WEBO = western burrowing owl; BNLL = blunt-nosed leopard lizard; and TKR = Tipton kangaroo rat.

Site 3-S (460.4 acres)

Site 3-S has been disked for weed control on a biannual basis, except for an irrigation ditch that is bounded on both sides by dirt roads and that is located to the north of the disked field. The ditch and roads are maintained to control weeds, but weedy species are present at a greater

frequency than on the disked portions of this site. The site is sparsely vegetated with weedy annual plant species (especially along the irrigation ditch), including London rocket (*Sisymbrium irio*), five-hook bassia, black mustard (*Brassica nigra*), seepweed, Russian thistle (*Salsola tragus*), Mediterranean grass, saltgrass (*Distichlis spicata*), tamarisk, quailbush, annual weedy chenopods, and annual sunflower. The adjacent land consists of disked fields, a fallow field with a small patch of Valley Sink Scrub, which is highly degraded by disking, native habitat with an expanse of Chenopod Scrub habitat, and ponding basins that are vegetated with tamarisk, seepweed, saltbush, and scattered iodine bush (*Allenrolfea occidentalis*).

Quad Knopf found no historical records indicating the occurrence of special status species on Site 3-S (See Figures 3-5A-D). No sensitive vegetation communities occur on the site and no special status species of plants were observed on the site. The disked portion of the site does not contain habitat that would support special status species (Quad Knopf 2010c). The irrigation ditch at the north end of the site is maintained (by scraping and perhaps by the use of herbicides) at a lesser frequency than the disked portions of the site, and may be more suitable to support special status plant species. Even though no special status plants were observed in this area and the habitat is of poor quality, this area might contain special status plants. However, this area is not within the Solar Development Footprint and is within an area that will be conserved as a Movement Corridor. There is also a potential that special status plant species may be present in adjacent native habitat that occurs to the west of the Site 3-S. Special status species potentially occurring in this adjacent habitat include heartscale, Lost Hills crownscale, recurved larkspur, Kern mallow, Hoover's eriastrum, Tejon poppy, San Joaquin woollythreads, and oil neststraw.

Based on a search of the CNDDDB database, much of Site 3-S was once occupied by Tipton kangaroo rats (see Figures 3-5A-D). However, the only Covered Species observed on the site was one western burrowing owl that was perched on the ground; no burrow was present (Table 3-9). The San Joaquin kit fox was not observed on the site, but may occasionally make forays onto and across the site. Covered Species observed on adjacent lands include western burrowing owl, blunt-nosed leopard lizard, and Tipton kangaroo rat. The Tipton kangaroo rat may also occur along the berms of a canal that is located within a Movement Corridor along the north end of the site. Although trapping was not conducted at this location and there are few burrows present, an unidentified kangaroo rat was observed along this canal (Appendix B). The Tipton kangaroo rat and the blunt-nosed leopard lizard may forage onto Site 3-S, and thus be subject to impacts from project construction, operations and maintenance, and decommissioning. To minimize impacts, barrier fencing will be installed along the edges of the site where these species occurs or may occur (see Figure 2-4), thus reducing the potential for take. Western burrowing owl dens and California horned lizard scat were observed on adjacent lands. Similarly, other special status species (e.g., western mastiff bat, white-tailed kite, and northern harrier) may overfly the project site from time to time.

Site 4-S (652.5 acres)

The entirety of Site 4-S has been disked on a biannual basis for weed control and there is no topographic relief. Along the margins are a few weedy species, such as amaranth (*Amaranthus* sp.), but the site is otherwise devoid of vegetation. The adjacent land consists of row crop fields (onions and carrots), disked fields, fallow fields, and alfalfa fields. A ponding basin vegetated with thick quailbush and some tamarisk, and a canal vegetated with cottonwood, tamarisk,

mulefat (*Baccharis salicifolia*) and five-hook bassia are adjacent to the southwest corner of the site.

Quad Knopf found no historical records indicating the occurrence of sensitive natural communities or special status plant species on Site 4-S (see Figures 3-5A-D), but it is likely that this site was once vegetated with Valley Saltbush Scrub, a sensitive natural community. Repeated disking has eliminated all native vegetation from the site, and there is no habitat present that would support special status plant species. Similarly, intensive agricultural activities occurring on adjacent lands have eliminated habitat that would support special status plant species from those areas, except perhaps on lands adjacent to the southwest corner of Site 4-S, where there is a remnant habitat patch.

Quad Knopf found no historic records indicating the occurrence of sensitive wildlife species on the site (see Figures 3-5A-D) and no special status wildlife species were observed on the site. San Joaquin kit fox and American badger may occasionally make forays onto and across the site, and other special status wildlife species (e.g., western mastiff bat, northern harrier, white-tailed kite) may overfly the project site from time to time. Northern harrier and a pair of Swainson's hawks were observed on adjacent lands.

Site 5-S (797.2 acres)

Site 5-S has been disked on a biannual basis for weed control and is all bare ground, except for an occasional weedy annual plant or plants that occur individually or in small isolated patches. Plants observed on this site included Bermuda grass (*Cynodon dactylon*), orchard bindweed (*Convolvulus arvensis*), Johnsongrass (*Sorghum halepense*), five-hook bassia, London rocket, Russian thistle, and lamb's quarters (*Chenopodium album*). Annual weedy atriplex occurs on some portions of this site, particularly along the margins. Some scattered patches of jimsonweed (*Datura wrightii*), prickly lettuce (*Lactuca serriola*), Mediterranean barley, and alkali mallow (*Malvella leprosa*) also were present. The adjacent lands are disked fields containing almond (*Prunus dulcis*) orchards, and an alfalfa field.

Quad Knopf found no historical records indicating the occurrence of special status species on Site 5-S (see Figures 3-5A-D), and no sensitive vegetation communities or special status plants were observed. The site does not contain habitat that is suitable to support special status plant species. Lands to the south, west, and east are cultivated and do not support special status species. Land to the north of Site 5-S, and separated from Site 5-S by South Lake Road, supports a variety of special status species (see descriptions of lands adjacent to Site 1-C).

Quad Knopf found historical records indicating the existence of the Tipton kangaroo rat on the northeast portion of Site 5-S or on lands adjacent to the northern border of the site (see Figures 3-5A-D). No Covered Species were observed on the site (Table 3-9). Tipton kangaroo rats are currently absent from the site, having been extirpated by the conversion of habitat through regular disking. The San Joaquin kit fox and western burrowing owl could be transients and occur on the site from time to time. The only special status species observed on this site was a white-tailed kite that was overflying the site (Table 3-9). Western burrowing owls were observed on the adjacent lands to the north. Other special status species (e.g., western mastiff bat and northern harrier) may overfly the project site from time to time.

Site 6-S (304.2 acres)

Site 6-S has been repeatedly disked for weed control and is bare ground with an occasional weedy plant, except for a small strip of land occurring within an existing railroad easement (see Appendix B). The vegetation existing in the railroad easement includes thick growth of London rocket, scattered Russian thistle, five-hook bassia, and annual atriplex (probably *Atriplex argentea*). A canal is present off site, along the southeastern border that contains some quailbush, annual sunflower, and some scattered tamarisk. Other lands adjacent to Site 6-S are disked fields, orchards, and the native chenopod scrub habitat that occurs between sites 2-S and 3-S.

Quad Knopf found no historic records indicating the occurrence of special status species on the Site 6-S (see Figures 3-5A-D), and no sensitive vegetation communities or special status species plants were observed on the site. No habitat that would support special status plant species occurs on the portion of this site that is within the Solar Development Footprint; however, some habitat is present within the existing railroad easement that could support special status plant species. Special status species might occur to the north on adjacent lands that are vegetated with disturbed saltbush scrub. Special status plant species potentially occurring on those adjacent lands include heartscale, Lost Hills crowscale, recurved larkspur, Kern mallow, Hoover's eriastrum, Tejon poppy, San Joaquin woollythreads, and oil neststraw.

Quad Knopf found no historic records indicating the occurrence of sensitive wildlife species on the site (see Figures 3-5A-D). The only Covered Species observed was a western burrowing owl; however, no burrow for this western burrowing owl was found, and it was therefore assumed to be foraging on the site and not a resident (see Appendix B and Table 3-9). The San Joaquin kit fox may occasionally make forays onto and across Site 6-S. Other special status species (e.g., western mastiff bat, white-tailed kite) may overfly the project site from time to time. On adjacent lands, western burrowing owl and northern harrier were recorded. The Tipton kangaroo rat, western burrowing owl, blunt-nosed leopard lizard, San Joaquin kit fox, loggerhead shrike, American badger, and California horned lizard could possibly occur north of the site in native chenopod scrub habitat. The site is isolated from this native habitat by South Lake Road, but the Tipton kangaroo rat and blunt-nosed leopard lizard could forage onto the site, and thus be subject to impacts from project construction, operations and maintenance, and decommissioning. To minimize impacts, barrier fencing will be installed along the edges of the site where these species occur or may occur (see Figure 2-4), thus reducing the potential for take.

Site 7-S (471.6 acres)

The entirety of this site has been disked on a biannual basis for weed control, except for a small strip of land occurring within an existing railroad easement and within an easement along South Lake Road. These areas are not within the Solar Development Footprint. The site is mostly bare ground, with some scattered patches of weedy species that recover after diskings, including five-hook bassia, yarrow (*Achillea millefolium*), annual sunflower, tamarisk, and some trunks of burned black willows. These plants are common in the existing easements. The site is surrounded by disked lands, orchards, and a fallow field that is vegetated with weedy species and tamarisk.

Quad Knopf found no historic records indicating the occurrence of special status plant species on the site (see Figures 3-5A-D), and no sensitive vegetation communities were present on the site. The site does not contain habitat that would support special status plants, except within existing easements that are not within the Solar Development Footprint. Lands surrounding this site are in active agriculture or are managed by repeated disking. It is unlikely that special status plant species occur on these adjacent lands.

Quad Knopf found no historic records indicating the occurrence of sensitive wildlife species on Site 7-S (see Figures 3-5A-D). Biologists made two observations of the western burrowing owl on the site, but no other observations of Covered Species or other special status wildlife species or their diagnostic signs (Table 3-9). The San Joaquin kit fox may occasionally make forays onto and across the project site. Other special status wildlife species (e.g., western mastiff bat, white-tailed kite) may occasionally overfly the project site. The habitat located within the railroad easement and within the easement along South Lake Road has the potential to harbor nesting loggerhead shrikes (*Lanius ludovicianus*), and other migratory birds and raptors. It is unlikely that the blunt-nosed leopard lizard or Tipton kangaroo rat occur in this area, because the dense, weedy understory is not a desirable habitat for these species. Native lands within Section 22, northwest of Site 7-S, are known to host the western burrowing owl, Tipton kangaroo rat, blunt-nosed leopard lizard, and California horned lizard; and may support San Joaquin kit fox, American badger, or loggerhead shrikes. Site 7-S is isolated from this native habitat by South Lake Road, but Tipton kangaroo rat and blunt-nosed leopard lizard could forage onto the site, and thus be subject to impacts from project construction, operations and maintenance, and decommissioning. To minimize impacts, barrier fencing will be installed along the edges of the site where these species occurs or may occur (see Figure 2-4), thus reducing the potential for take.

Site 15-S (483.6 acres)

Site 15-S is entirely disked for weed control and is devoid of vegetation. Disturbed Valley Sink Scrub, a sensitive vegetative community, occurs to the northeast of Site 15-S. Other surrounding lands are disked fields, alfalfa fields, asparagus fields, a vineyard, and a fallow field that is mostly vegetated with London rocket. A ponding basin that contains tamarisk, red willow (*Salix laevigata*), black willow, mulefat, yarrow, quailbush, seepweed, common cattails, and Mexican milkweed (*Asclepias fascicularis*) is located north of this site.

There is a historic record of Comanche Point layia (*Layia leucopappa*) occurring in the vicinity the site (see Figures 3-5A-D). The accuracy of that recorded observation is a one-mile radius, and although the record overlaps the site, it is not known whether the species occurred within Site 15-S. Currently no sensitive vegetation communities or special status plant species are present on the site because of the repeated disking that routinely occurs, and there is no habitat that would support Comanche Point layia. Disturbed Valley Sink Scrub, a sensitive vegetative community, occurs to the northeast and east of Site 15-S. This was likely the dominant natural vegetation community occurring on Site 15-S prior to the site's conversion to agricultural use. The potential exists for Comanche Point layia to occur on adjacent lands north and east of the site.

A review of CNDDDB records indicate that Site 15-S was once occupied by San Joaquin kit fox (see Figures 3-5A-D). Quad Knopf found no evidence that any Covered Species occur on the site, but a San Joaquin kit fox and five western burrowing owls were observed to the east of the site on adjacent lands. These Covered Species could occur on the site as transients. Although the site itself has little potential to harbor sensitive biological resources, except as transients or foragers, the Valley Sink Scrub habitat to the north and east of the site has the potential to support the blunt-nosed leopard lizard, Tipton kangaroo rat, Nelson's antelope squirrel, San Joaquin kit fox, and western burrowing owl, which are known to occur on those lands. The Tipton kangaroo rat, Nelson's antelope squirrel, and blunt-nosed leopard lizard could forage onto the site, and thus be subject to impacts from project construction, operations and maintenance, and decommissioning. To minimize impacts, barrier fencing will be installed along the edges of the site where these species occur or may occur (see Figure 2-4), thus reducing the potential for take.

Conservation Areas

Although the Movement Corridors are technically included along with the acreage described within the Solar Sites, the Movement Corridors will be part of the areas managed as conservation areas, and thus are discussed in this section. This discussion includes Movement Corridors that are present along the northern border of site 2-S (2-M), along the northern and eastern borders of site 3-S (3-M), along the southern border of site 4-S (4-M), and along the northern border of 7-S (7-MW and 7-ME). This section also describes the conditions present on and adjacent to each of the six Conservation Sites (1-C, 3-C, 3-C2, 9-C, 10-C, and 17-C).

Existing conditions on lands that will be set aside for the conservation of species are variable, consisting of lands that are currently disked, and lands that contain native habitat and are known to currently support Covered Species. Information on current conditions of these lands was summarized from the studies conducted on the Maricopa Sun Solar Complex sites (Quad Knopf 2010a, 2010b, 2010c, 2010d, 2012) (Appendix G), and from supplemental studies for the Maricopa West Solar Project (Quad Knopf 2010e), which are summarized in Appendix B.

Movement Corridors

The Project includes four Movement Corridors totaling 33.8 acres. The Movement Corridors are distinct from the Solar Development Footprint and will be avoided by construction activities. During development of solar facilities, the Movement Corridors will be managed for the benefit of Covered Species to facilitate their movement in and around the Solar Sites. Movement Corridors will be protected under the same conservation easement placed on adjoining Solar Sites at the point building permits are acquired for those Solar Sites. Movement Corridors will be incorporated into the conservation strategy undertaken on the adjoining Solar Site, and protected and managed for Covered Species in perpetuity once the solar project is decommissioned.

MOVEMENT CORRIDOR 2-M (12.5 ACRES)

Movement Corridor 2-M is located along the northern border of Site 2-S. The corridor includes an earthen berm and an existing wetland. Much of this corridor is bare ground and is in a disked state, but some scattered vegetation exists along the earthen berm. No sensitive vegetation

communities occur within this corridor (aside from the disked wetland area), and it is unlikely that this area contains special status plant species due to the routine disking and other maintenance activities. Covered Species were not observed within this corridor. Some burrows exist along the earthen berm and the Tipton kangaroo rat might exist in very low numbers within this corridor.

MOVEMENT CORRIDOR 3-M (7.8 ACRES)

Movement Corridor 3-M is located along the northern and eastern borders of Site 3-S. The portion of the corridor along the northern border contains an irrigation canal. Portions of the northern corridor and the entire eastern corridor are managed by routine disking. The canal portion of the northern corridor is maintained by removing weedy plant species, but at a frequency that is somewhat less than the disked areas. Along the canal, within the corridor, is a dirt road that is not vegetated, other than with scattered weedy species (e.g., five-hook bassia). Consequently, the disked portions are barren ground with scattered plants invading between periods of disking, whereas the irrigation canal is more heavily vegetated. No sensitive vegetation communities occur within this corridor, and it is unlikely that this area contains special status plant species due to the routine disking and other maintenance activities. Covered Species were not observed within this corridor. However, some small mammal burrows exist along the canal, an unidentified kangaroo rat was observed along the road that follows the canal, and the Tipton kangaroo rat might exist in very low numbers within this corridor.

MOVEMENT CORRIDOR 4-M (6.1 ACRES)

Movement Corridor 4-M is located along the southern border of Site S-4. It consists entirely of bare ground that has been subject to repeated disking. It does not contain habitat capable of supporting Covered Species or special status plant species.

MOVEMENT CORRIDOR 7-M (7.4 ACRES)

This corridor consists of two separate areas: one area (7-MW) that follows an east-west easement along South Lake Road, connecting with the railroad easement on its east end; and another area (7-ME) along the northern border of Site 7-S that connects Site 3-C2 to Movement Corridor 4-M. Both of these areas consist of disked lands that contain no vegetation other than an occasional weedy plant. No Covered Species were observed and no special status plants or special status wildlife species occur on these lands. Lands adjacent to these corridors (i.e., the easement along South Lake Road, the railroad easement, and site 3-C2) are known to contain habitat that might support Covered Species.

Conservation Sites

The six Conservation Sites encompass 1,894.4 acres (See Figure 1-2; Table 2-1). The Conservation Sites will be placed into a permanent Conservation Easement and managed in perpetuity for the benefit of Covered Species and other special status species. Enhancements, management actions and goals, and long-term monitoring of these lands are described in Chapter 5. The description of current conditions on each Conservation Site and justifications for adopting these sites as conservation lands are presented in Appendix G. Site conditions are summarized below.

SITE 1-C (656.6 ACRES)

This site is regularly disked for weed control and the majority of the site contains no vegetation, but there is an old levee structure in the northwest corner of the site that is not disked. That structure is vegetated with valley saltbush, quailbush, and *Isocoma*. The site historically contained freshwater shrub wetlands (USFWS 2012). The area lacks hydric soils or wetland vegetation, but there are some remnant characteristics that indicate past water flows across the site from southwest to northeast. Those areas that exhibit signs of flow have been determined by the USACE to be federally regulated waters that are hydrologically connected to a Traditional Navigable Water (per communication, Ramon Aberasturi, USACE).

The site is sparsely vegetated with weedy plant species, including fiddleneck, orchard bindweed, Bermuda grass, London rocket, tamarisk and quailbush. There are scattered Allscale saltbush shrubs and seepweed along the levee and the basins associated with the levee. There are native Valley Sink Scrub and saltbush scrub habitats present on the adjacent land, to the north and west of Site 1-C, which are known to contain sensitive species. The other surrounding land use includes alfalfa production, orchards, and disked fields.

Quad Knopf found no historical records indicating the occurrence of special-status plant species on Site 1-C (see Figures 3-5A-D), but it is likely that the site was once vegetated with saltbush scrub, which is a sensitive vegetation community. Past disking has eliminated all but a small portion of the saltbush scrub habitat type, which is now restricted to the northeast corner. That area will be enhanced as described in Section 5, *Conservation Program*. No special status plants or habitat that would support special status plants are present on the site. Native Valley Sink Scrub and saltbush scrub habitat is present on the adjacent land to the north and west of the project site. Special status plant species that might occur in these adjacent lands include heartscale, Lost Hills crownscale, recurved larkspur, Kern mallow, Hoover's eriastrum, Tejon poppy, San Joaquin woollythreads, and oil neststraw.

There are historical records of the Tipton kangaroo rat existing along the southern portion of the site (see Figures 3-5A-D). The only Covered Species observed on the site was the Tipton kangaroo rat (Quad Knopf 2010a) (Table 3-10), which occur in the northeast corner of the site, which contains non-disked habitat. A very narrow strip at the margins of South Lake Road, where the existing road easement is not disked, was trapped for the Tipton kangaroo rat, but none were captured in that area. The habitat occurring within the northwest corner of the site provides suitable habitat not only for the Tipton kangaroo rat but also for the San Joaquin pocket mouse (*Perognathus inornatus inornatus*), Tulare grasshopper mouse (*Onychomys torridus tularensis*), and other special status species. Western burrowing owl, Nelson's antelope squirrels, and a San Joaquin kit fox skull were found in adjacent habitats. Observations of northern harrier and diagnostic sign of American badger were observed in adjacent native habitat. These species could forage on or otherwise occur as transient visitors to the site. Other special status species (e.g., western mastiff bat and white-tailed kite) may overfly the project site from time to time. Other special status species that might also occur in the adjacent lands include LeConte's thrasher (*Toxostoma lecontei*), and blunt-nosed leopard lizard.

Table 3-10
Existing Maricopa Sun Solar Complex Conservation Sites Conditions
and Presence of Covered Species

Site No.	Area (Acres)	Site Condition/Vegetation	Presence of Covered Species*
1-C	656.6	Fallow farmland, actively disked for weed control, little vegetation except in the northwest corner along an existing levee; mapped as NWI freshwater shrub wetlands; however, field surveys determined that the area lacks hydric soils or wetland vegetation, but USACE determines that federal Waters are present	TKR observed on site. SJKF, NAS, and WEBO observed on adjacent lands and may be transients on site. BNLL may also be present on adjacent lands, but protocol surveys failed to locate them
3-C	80.4	Fallow farmland, actively disked for weed control, no vegetation	No Covered Species observed. Adjacent lands contain WEBO, TKR, BNLL, and possibly NAS and SJKF
3-C2	152.9	Fallow farmland which was managed for weed control in past years, but disking has not occurred in recent years; the site has partially recovered, supporting annual grasses, seepweed, and some scattered saltbush and tamarisk	WEBO observed. No TKR captured despite extensive trapping. SJKF may be a transient
9-C	180.6	83.25 acres vegetated with Atriplex scrub, the remainder is disked with no vegetation	WEBO, NAS, and TKR are known to occur on the 83.25 acre portion. BNLL and SJKF might also be present. WEBO and SJKF may be a transient on the remaining portion of this site
10-C	176.2	Fallow farmland, actively disked for weed control, no vegetation	No Covered Species were observed. The SJKF, WEBO, NAS, TKR, and BNLL are all known to occur nearby
17-C	647.7	Relatively natural state, consisting of saltbush and goldenbush dominated scrublands	No Covered Species observed. Two special status species observed on site. WEBO, SJKF, BNLL, and NAS are known from nearby. The site is located within the "Core" area of SJKF

*WEBO = western burrowing owl, SJKF = San Joaquin kit fox, NAS = Nelson's antelope squirrel. TKR = Tipton kangaroo rat, BNLL = blunt-nosed leopard lizard.

SITE 3-C (80.4 ACRES)

Site 3-C is located along the western edge of Site 3-S. It has been disked on a biannual basis and is devoid of vegetation. Site 3-C formerly supported agricultural land uses and has been kept in a farm-ready condition by repeated disking and is surrounded on three sides by native saltbush scrub habitat. This site does not contain habitat that is suitable to support special status plant species and none were observed during surveys. No Covered Species were observed on this site. Lands adjacent to this site are known to contain the western burrowing owl, blunt-nosed leopard lizard, and Tipton kangaroo rat. These species, along with the San Joaquin kit fox, could be present as transients and could become established on the site once disking ceases. Other special status species (e.g., western mastiff bat, white-tailed kite, and northern harrier) may overfly the project site from time to time.

SITE 3-C2 (152.9 ACRES)

Site 3-C2 is vegetated with a matrix of introduced grasses, seepweed, and some scattered saltbush scrub and tamarisk. The entirety of this site had been disked for weed control on a biannual basis, but it has not been disked in a number of years. The site is sparsely vegetated with weedy annual plant species, including London rocket, five-hook bassia, black mustard, seepweed, Russian thistle, Mediterranean grass, saltgrass, tamarisk, quailbush, annual weedy chenopods, and annual sunflower. London rocket is very dense on portions of this site, and other areas have a preponderance of bare ground. The adjacent land consists of disked fields to the east, and saltbush scrub to the south and west. To the north is a matrix of disturbed saltbush scrub and alkali sink habitat.

Quad Knopf found no historical records indicating the occurrence of special status species on the site (see Figures 3-5A-D). No sensitive vegetation communities or special status plant species were present on the site (Quad Knopf 2010a). It is reasonable to conclude that there is an absence of special status plant species because of the regular disking, but there is the potential that they could become established as recovery of this site proceeds. The potential exists that special status plant species may be present in adjacent native habitat that occurs to the north, south and west of the site. Special status species potentially occurring in this adjacent habitat include heartscale, Lost Hills crownscale, recurved larkspur, Kern mallow, Hoover's eriastrum, Tejon poppy, San Joaquin woollythreads, and oil neststraw.

Based on a search of the CNDDDB database, much of this site was once occupied by Tipton kangaroo rats (see Figures 3-5A-D). This site is known to contain western burrowing owls and the habitat appears to be suitable to support the Tipton kangaroo rat, but none were captured on this site during trapping efforts (Quad Knopf 2010a). Although there is no evidence to support a determination of their presence, the Tipton kangaroo rat, San Joaquin kit fox, and blunt-nosed leopard lizard could become established within this site. Special status species observed on adjacent lands include western burrowing owl, northern harrier, blunt-nosed leopard lizard, and Tipton kangaroo rat.

SITE 9-C (180.6 ACRES)

Site 9-C borders native habitat that occurs along the right-of-way of the California Aqueduct, which provides a viable movement corridor for a wide variety of special status species, including those species that will be covered by this MSHCP. The northernmost portion of Site 9-C has been disked on a biannual basis for weed control, and is nearly devoid of vegetation. The southernmost 83.25-acre portion of the site and areas to the south and west of Site 9-C are vegetated with Atriplex scrub habitat. These areas mostly contain Saltbush Scrub, a sensitive vegetative community, dominated by saltbush with sparse ground cover of fiddleneck and Mediterranean grass. Some disking, mounding of dirt, and other disturbances are present near the center of this patch of Saltbush Scrub habitat.

The land south of the southeast corner of Site 9-C consists of non-native grassland habitat that exhibits signs of previous sheep grazing (e.g., sheep pellets, tracks, and sheep carcass). A stubble

field along the east perimeter of Site 9-C contains a substantial amount of Russian thistle and some tamarisk. Cadet Road to the north of the site separates Site 9-C from almond orchards.

The southern 83.25-acre portion of Site 9-C is known to provide habitat for the Tipton kangaroo rat, Nelson's antelope squirrel, and western burrowing owl, and is likely to be used by the San Joaquin kit fox. The blunt-nosed leopard lizard might also be present in this site, although protocol-level surveys failed to verify its presence.

SITE 10-C (176.2 ACRES)

Site 10-C is repeatedly disked for weed control and it currently lacks vegetation. Irrigation standpipes and pumps are present within this site, indicating past agricultural use. The habitat adjacent to the south and west of Site 10-C is vegetated with Allscale saltbush. These areas are used for sheep grazing, which is particularly evident to the south of the site. The off-site area to the west and southwest is used for oil production, with numerous active and inactive oil wells present. The habitat adjacent to the north of the site, along the California Aqueduct right-of-way, is vegetated with saltbush scrub, tamarisk, and other shrub species. The California Aqueduct right-of-way is a known corridor for a variety of special status wildlife species. Along the east side of the project site are disked fields, divided by a middle section consisting of an almond orchard. To the east, beyond these disked fields, are almond and apricot orchards.

This site is not known to support Covered Species, although the San Joaquin kit fox and western burrowing owl may forage on the site or be present as transients. As is the case with Site 9-C, Site 10-C is contiguous with existing habitat along the California Aqueduct, and native habitat occurs to the west and south of the site. Because this site is close to existing habitat, it is likely that the site will recover and provide conservation benefits to Covered Species rather quickly, providing habitat for San Joaquin kit fox, western burrowing owl, Nelson's antelope squirrel, blunt-nosed leopard lizard, and Tipton kangaroo rat.

The historic geographic range of the Tipton kangaroo rat was limited to arid-land communities occupying the valley floor of the Tulare Basin (USFWS 2010). The spatial distribution extended from Lemoore and Hanford (Kings County) in the north; southeast along State Route 99 south to Arvin (Kern County); and then westward to the southern, eastern, and northern shores of the former Buena Vista Lake (Kern County); and then northward through the Antelope Plain along a line marked by Buttonwillow, Lost Hills (Kern County), Kettleman City (Kings County), and Westhaven (Fresno County; Service 1988:25609).

The current distribution is not well known or documented. The presence of Tipton kangaroo rats at sites south of Buena Vista Lake is not certain and several sites actually occupied by Tipton kangaroo rats at present are not characterized as being within the current distribution (USFWS 2010). Nonetheless, the general boundaries of the south and west portions of the range of this species is considered to coincide with the California Aqueduct (Williams 1986). This has been generally accepted by the biological community and holds true with some exceptions: it is not clear whether the Tipton kangaroo rat formerly or currently occurs in the Lokern Natural Area (USFWS 2010), and the Tipton kangaroo rat is a targeted species for protection in that area; and

there are multiple CNDDDB records of Tipton kangaroo rats located south of the California Aqueduct in the area adjacent to Site 10-C (CNDDDB 2013).

The habitat in the vicinity of Site 10-C, being saltbush scrub on the floor of the valley rather than on the alluvial plain of the coast or transverse range, is suitable for Tipton kangaroo rats. The morphology of individuals captured from this area is representative of both Tipton kangaroo rat and short-nosed kangaroo rat (*D. n. brevinasus*) characteristics, thus suggesting that this limited geographic area represents an intergrade zone for this species (Uptain, unpubl. Data). Although it would be reasonable to include Site 10-C as conservation habitat for the Tipton kangaroo rat, we have not done so because of the ongoing controversy of range boundaries and species identifications.

SITE 17-C (647.7 ACRES)

Site 17-C is in a relatively natural state, having never been actively farmed or tilled. Vegetation on the site is predominantly Chenopod Scrub, along with non-native grassland mosaic. Valley Saltbush Scrub, a CDFW sensitive natural community, is present over a large portion of the site (see Figures 3-5A-D). No other sensitive natural vegetative communities are present on the site or in the project vicinity. Two special status species were observed on the project site: vinegar weed, which is a CNPS list 1B plant, and the loggerhead shrike, which is on the CDFW watch list. No Covered Species were observed on the site, but there are historic records of the blunt-nosed leopard lizard, San Joaquin kit fox, and Nelson's antelope squirrel in the vicinity of this site, and the habitat on this site is suitable to support these species. The site does not occur within the range of the Tipton kangaroo rat. The American badger also occurs within the vicinity of the site (see Figures 3-5A-D). Suitable habitat exists on the site to support wildlife and several species are likely to be present (Quad Knopf 2009). The San Joaquin kit fox "core" habitat (USFWS 1983) occurs in the western portion of the site and the site is nearly contiguous with Windwolves Preserve, which provides an east-west linkage corridor for the species (Appendix H).

3.3 Covered Species

The species covered under the authority of this MSHCP are those species that are currently listed or are likely to become listed by the federal government within the project's life, and which may be subject to "take" as defined by the federal Endangered Species Act (Table 3-11). The definition of special status species, the criteria used to evaluate whether any particular species should be covered by the MSHCP, the final list of Covered Species, and the known occurrence and brief description of potential impacts to those species are presented in the sections below.

Species considered for coverage by this MSHCP include plants and animals that are legally protected under FESA, CESA, or other regulations; and species that are considered sufficiently rare by the scientific community to qualify for such listing, and include species that are:

- Listed or proposed for listing as threatened or endangered under the FESA (50 Code of Federal Regulations [CFR] 17.12 [listed plants] and various notices in the Federal Register [FR] [proposed species]);

- Candidates for possible future listing as threatened or endangered under the FESA (66 FR 54808, October 2001);
- Listed or proposed for listing as threatened or endangered under FESA (50 CFE 17.11 [listed animals] and various notices in the FR [proposed species]); and
- Candidates for possible future listing as threatened or endangered under FESA (66 FR 54808, October 30, 2001).

3.3.1 COVERED SPECIES EVALUATION CRITERIA

To determine which species would be covered by the MSHCP, a list of species that occur or may occur in the Project area was compiled on the basis of information from the following resources:

- CNDDDB;
- CNPS's (2010) Electronic Inventory of Rare and Endangered Vascular Plants of California; and
- USFWS's federally-protected species list.

A list of 17 species was generated from these sources, and the potential occurrence of these species in the Permit Area and surrounding lands was evaluated based on the following criteria (Quad Knopf 2010c). For each species with potential to occur in the Project area (based upon their presence in the CNDDDB, occurrence in a list of species generated by topographic quadrangle by the USFWS, or suitable habitat occurring on and adjacent to the Project sites), information was gathered on its status, distribution, ecological information, threats, recovery actions, and conservation and management efforts. The following criteria were then applied to each species to determine whether it would be covered by this MSHCP. To be covered, a species had to meet the following criteria:

- **Status:** The species is protected under the FESA of 1973 or is likely to become listed within the permit term (35 years);
- **Range:** The species is historically known to occur within the project vicinity or will likely occur on or near the Solar Sites during project implementation;
- **Occurrence:** The species is known to occur in the project vicinity based on presence of credible evidence, or the species could potentially become present on the Solar Sites during the course of the project because of project-related habitat enhancements;
- **Habitat:** Suitable habitat for the species exists on the Solar Sites or on land adjacent to the Solar Sites; therefore, the species is potentially present or may become present during the course of the project; and
- **Potential for Take:** The species will likely be subject to take by covered activities.

A summary of the evaluation criteria and determinations of Covered Species are provided in Table 3-11.

3.3.2 COVERED SPECIES DESCRIPTIONS

This MSHCP covers five species that may be subject to take by Covered Activities (Table 3-12). Although not all of these species currently inhabit the Solar Development Footprint, they may inhabit adjoining properties or may become established on the Solar Development Footprint or Conservation Sites and Movement Corridors as disking ceases and habitat enhancement is implemented. A summary of the natural history of these species and the occurrence of Covered Species within the Permit Area is below. A complete analysis of the risk of take to these species is presented in Chapter 4, *Potential Biological Impacts and Levels of Take*, of this MSHCP. Natural history information for species not covered by this MSHCP and reasons for not pursuing coverage of certain species are presented in Appendix I.

San Joaquin Kit Fox (Vulpes macrotis mutica)

STATUS

The San Joaquin kit fox was listed as endangered by the U.S. Department of the Interior in 1967 and listed as threatened by the State of California in 1971 (USFWS 1983). A Recovery Plan for Upland Species of the San Joaquin Valley that outlines objectives to halt the decline of the species and increase population sizes was first completed in 1983 and then followed with a revised recovery strategy in 1998. Subsequent conservation actions have included acquisition of important habitat by the BLM, CDFW, California Energy Commission, Bureau of Reclamation, USFWS, the Center for Natural Lands Management, Windwolves Preserve, and the Nature Conservancy. Substantial long-term research has been conducted on populations in the Naval Petroleum Reserves and in the Carrizo Natural Area. The Endangered Species Recovery Program (ESRP) has been conducting a wide range of studies in recent years. These studies have provided important information on kit fox habitat requirements, behavior, demographics, and threats.

The goal of the recovery plan is to maintain a viable metapopulation of San Joaquin kit foxes on private and public lands throughout the species' range. This will include preservation of existing core and satellite populations. Areas where core populations are found include the Carrizo Plain Natural Area in San Luis Obispo County; the natural lands of western Kern County, including the Naval Petroleum Reserves, the Lokern Natural Area, and adjacent natural lands inhabited by San Joaquin kit foxes; and the Ciervo-Panoche Natural Area of western Fresno and eastern San Benito Counties. Camp Roberts and Fort Hunter Liggett also provide important habitat for San Joaquin kit foxes in the Salinas and Pajaro River watersheds. Additional lands in the San Joaquin Valley that have San Joaquin kit foxes or the potential to have them include refuges and other lands managed by the CDFW, California Department of Water Resources, Center for Natural Lands Management, Lemoore Naval Air Station, Bureau of Reclamation, USFWS, as well as various private lands in these areas.

Table 3-11
Evaluation of Species for Coverage by the MSHCP

Species	Status		Criteria for Likelihood of Occurrence			Potential for Take	Covered Species	Comments
	Federal	State	Range	Occurrence	Habitat			
Plants								
<i>Caulanthus californicus</i> (= <i>Stanfordia californica</i>) California jewel-flower	FE	CE, 1B.1	N	N	N	N	N	Suitable habitat to support this species does not occur within the Solar Sites or on adjacent lands. This species is thought to be extinct on the floor of the San Joaquin Valley.
<i>Eremalche kernensis</i> Kern mallow	FE	1B.1	Y	N	N	N	N	Suitable habitat that would support this species does not occur within the Solar Sites. Suitable habitat is located on some adjacent lands: to the north and northwest of Site 1-C, east of Site 2-S, and west of Site 3-S. These areas are not within the Solar Development Footprint and will be avoided by project activities. An analysis of potential project affects to this species is presented in Appendix I. There is suitable habitat on two conservation sites -- in the southern 83.25 acres of Site 9-C and on 17-C, although this species was not identified in those areas.
<i>Monolopia (Lembertia) congdonii</i> San Joaquin woollythreads	FE	1B.2	N	N	N	N	N	Suitable habitat that would support this species does not occur within the Solar Sites. Suitable habitat is located on some adjacent lands: to the north and northwest of Site 1-C, east of Site 2-S, and west of Site 3-S. These areas are not within the Solar Development Footprint and will be avoided by project activities. An analysis of potential project affects to this species is presented in Appendix I. There is suitable habitat on two conservation sites -- in the southern 83.25 acres of Site 9-C and on 17-C. although this species was not identified in those areas.
Invertebrates								
<i>Branchinecta lynchi</i> vernal pool fairy shrimp	FT	-	N	N	N	N	N	Suitable habitat for this species does not occur within the Permit Area.

Table 3-11
Evaluation of Species for Coverage by the MSHCP (Continued)

Species	Status		Criteria for Likelihood of Occurrence			Potential for Take	Covered Species	Comments
	Federal	State	Range	Occurrence	Habitat			
<i>Desmocerus californicus dimorphus</i> Valley elderberry longhorn beetle	FT	-	N	N	N	N	N	Suitable habitat for this species does not occur within the Permit Area. The Project will not result in take of this species.
<i>Euproserpinus euterpe</i> Kern primrose sphinx moth	FT	-	N	N	N	N	N	The Permit Area is outside of the known range of this species and suitable habitat for this species does not exist in the Permit Area. The project will not result in take of this species.
Fishes								
<i>Hypomesus transpacificus</i> Delta smelt	FT	CT	N	N	N	N	N	The Permit Area is not within the known range of this species, suitable habitat to support this species does not occur within the Permit Area, and the project will not result in take of this species.
Amphibians								
<i>Rana draytonii</i> California red-legged frog	FT	-	N	N	N	N	N	The Permit Area is outside of the known range of this species and there is no habitat within the Permit Area that would support this species. The project will not result in take of this species.
Reptiles								
<i>Thamnophis gigas</i> giant garter snake	FT	CT	N	N	N	N	N	There is no habitat within the Permit Area that would support this species. The project will not result in take of this species.
<i>Gambelia sila</i> Blunt-nosed leopard lizard	FE	SE	Y	Y	Y	Y	Y	This species occurs on lands adjacent to some of the Solar Sites and Conservation Sites. The project will result in take of this species in the form of harm and harassment through the loss of habitat.
Birds								
<i>Athene cunicularia</i> western burrowing owl	-	CSC	Y	Y	Y	Y	Y	This species historically occurs within five miles of the Permit Area and was observed within the Permit Area. The Project could result in take of this species in the form of harm and harassment through loss of habitat.

Table 3-11
Evaluation of Species for Coverage by the MSHCP (Continued)

Species	Status		Criteria for Likelihood of Occurrence			Potential for Take	Covered Species	Comments
	Federal	State	Range	Occurrence	Habitat			
<i>Charadrius alexandrinus nivosus</i> western snowy plover	FT	-	N	N	N	N	N	This species would not occur within the Permit Area, except possibly as a seasonal transient. The Project will not result in take of this species.
<i>Gymnogyps californianus</i> California condor	FE	CE	N	N	N	N	N	This species does not historically occur within five miles of the Permit Area, and it was not observed in the Permit Area. The project will not result in take of this species.
Mammals								
<i>Dipodomys ingens</i> giant kangaroo rat	FE	CE	Y	N	N	N	N	This species historically occurs within five miles of the Permit Area, but neither this species nor its sign was observed within the Permit Area or adjacent land. Suitable habitat is not present within the Permit Area or on adjacent land. The project will not result in take of this species.
<i>Ammodramus nelsoni</i> <i>Nelson's antelope squirrel</i>	-	CT	Y	Y	Y	Y	Y	This species occurs in the Project vicinity, is currently listed as threatened by the State of California, and may become listed by the federal government during the life of the Project. The Project could result in take of this species in the form of harm and harassment through the loss of habitat.
<i>Dipodomys nitratoides nitratoides</i> Tipton kangaroo rat	FE	CE	Y	Y	Y	Y	Y	This species historically occurs within the Permit Area and on adjacent land, it is present on Sites 1-C and 9-C, and it is present on lands adjacent to sites 2-S and 3-S, and perhaps 15-S. The Project will result in take of this species.
<i>Sorex ornatus relictus</i> Buena Vista Lake shrew	FE	CSC	Y	N	N	N	N	This species historically occurs within five miles of the Permit Area. There is low quality habitat for this species occurring in ponding basins on lands adjacent to some Solar Sites, but no habitat capable of supporting this species occurs within the Solar Development Footprint. This species was not captured during trapping efforts. The Project will not result in take of this species.

Table 3-11
Evaluation of Species for Coverage by the MSHCP (Continued)

Species	Status		Criteria for Likelihood of Occurrence			Potential for Take	Covered Species	Comments
	Federal	State	Range	Occurrence	Habitat			
<i>Vulpes macrotis mutica</i> San Joaquin kit fox	FE	CT	Y	Y	Y	Y	Y	This species occurs within the Project vicinity and likely historically occurred within the Permit Area. It is likely that this species is present on the Solar Sites as a transient forager, and would be subject to take during construction and operation of the project. Suitable habitat to support this species occurs on Conservation Sites 3-C2, 9-C, and 17-C.

* These species have the potential to become candidates for listing, threatened, or endangered by the United States Fish and Wildlife Service during the operational life of the Project and are therefore included as Covered Species.

Table 3-12
List of Species Proposed for Coverage, MSHCP

Common Name	Scientific Name	Status*		
		Federal	State	Other
Mammals				
San Joaquin kit fox	<i>Vulpes macrotis mutica</i>	FE	ST	-
Tipton kangaroo rat	<i>Dipodomys nitratooides nitratooides</i>	FE	SE	-
Nelson’s antelope squirrel	<i>Ammospermophilus nelsoni</i>	-	ST	-
Birds				
Western burrowing owl	<i>Athene cunicularia</i>	-	CSSC	MBTA
Reptiles				
Blunt-nosed leopard lizard	<i>Gambelia sila</i>	FE	SE	FPS

- Status designations are: CSC = California Special of Special Concern, FE = federally endangered, FPS = fully protected species, FT = federally threatened, SE = State endangered, ST = State threatened, MBTA = protected by the Migratory Bird Treaty Act.

LIFE HISTORY

San Joaquin kit fox currently only inhabits the San Joaquin Valley and surrounding foothills of the Coast Ranges, Sierra Nevada, and Tehachapi Mountains, and on the Carrizo and Elkhorn Plains. Much of the historic natural vegetative communities within the range of the San Joaquin kit fox has been eliminated and is now represented only by small, isolated and degraded remnants. Accordingly, San Joaquin kit foxes are now primarily confined to isolated parcels of natural lands in Kern, Tulare, Kings, Fresno, Madera, San Benito, Merced, Stanislaus, San Joaquin, Alameda, and Contra Costa counties.

San Joaquin kit foxes occur in a variety of habitats, including grassland, scrublands, oak woodland, alkali sink scrubland, vernal pool areas, and alkali meadow communities. San Joaquin kit foxes are also known to occur in extensively modified habitats, such as oil fields and wind turbine facilities (USFWS 1998). They are present, but generally less abundant, in other highly modified landscapes, such as agricultural row crops, irrigated pastures, orchards, vineyards, and grazed annual grassland. They prefer habitats with loose-textured soils that are suitable for digging, but they occur on every soil type found in the Central Valley and surrounding foothills.

The diet of San Joaquin kit foxes varies with season and geographic locality, based on local availability of potential prey. Typically the diet consists of kangaroo rats, pocket mice, white-footed mice, and other nocturnal rodents. San Joaquin kit foxes also prey on black-tailed hares, Nelson's antelope squirrels, desert cottontails, ground-nesting birds, and insects (USFWS 1998).

San Joaquin kit foxes can, but do not necessarily, breed their first year. Adult pairs of foxes stay together throughout the year and can begin breeding at one year of age. During September and October, females begin to clean and enlarge their pupping dens, and mating usually occurs between December and March. Litters of two to six pups are born between February and late March, with pups emerging from the den after about a month. Population growth rates generally

vary positively with reproductive success, and kit fox density is often positively related to both current and the previous year's prey availability (Cypher et al. 2000).

San Joaquin kit fox dens are generally located in open areas with grass or grass and scattered brush, and seldom occur in areas with thick brush. Preferred sites are relatively flat, well-drained terrain (USFWS 1998). The kit fox requires underground dens for temperature regulation, shelter, reproduction, and predator avoidance. Dens are usually located on loose-textured soils on slopes less than 40 degrees, but the characteristics (number of openings, shape, slope, aspect) of dens vary across the fox's geographic range. Kit foxes dig their own dens, but also use those constructed by other animals. They also frequently use human-made structures (culverts, abandoned pipelines, or banks in sumps or roadbeds) as den sites.

Kit foxes may range up to 20 miles at night (Girard 2001) during the breeding season, and somewhat less (6 miles) during the pup-rearing season. Home ranges vary from less than 1 square mile up to approximately 12 square miles (Knapp 1978; Spiegel and Bradbury 1992; White and Ralls 1993).

OCCURRENCE WITHIN THE PERMIT AREA

San Joaquin kit foxes were not observed within the Permit Area or on surrounding lands during night spotlighting surveys or track and camera station monitoring conducted for the Project (Quad Knopf 2010c); however, they were observed on land adjacent to the east side of Site 15-S (see Appendix B). Potential San Joaquin kit fox dens were located on lands adjacent to the north and west of Site 1-C, and a San Joaquin kit fox skull was found on adjacent lands along the western boundary of Site 1-C (see Appendix B). The CNDDB reports 25 records of San Joaquin kit foxes within five miles of the Permit Area (see Figure 3-5B) between 1971 and 2002. The largest concentration of these records is located to the west and south of the Permit Area. The Solar Sites and all other portions of the Permit Area, including Conservation Sites, are dispersal habitat for the San Joaquin kit fox (See Appendices G and H).

Tipton Kangaroo Rat (*Dipodomys nitratoides nitratoides*)

STATUS

The Tipton kangaroo rat was listed as endangered by the U.S. Department of the Interior in 1988, and listed as endangered by the State of California in 1989. Recovery actions covered in the Recovery Plan for Upland Species of the San Joaquin Valley (USFWS 1998) include habitat management studies of Tipton kangaroo rats at sites representing the range of existing habitat conditions for the species; studies of competition between Tipton and Heermann's kangaroo rat, focusing on how different habitat management affects the population dynamics of the two species at sites of coexistence; population studies that measure population size and environmental fluctuations at sites representative of the range of natural land area and habitat conditions for the species; and inventories and assessments of existing natural lands.

LIFE HISTORY

The historical geographic range of Tipton kangaroo rats was over 1.7 million acres of arid-land communities occupying the valley floor of the Tulare Basin. By 1985, the inhabited area had been reduced to about 60,000 acres or about 4 percent of the historically occupied acreage. Currently, Tipton kangaroo rats inhabit small, scattered, isolated fragments of remnant habitat. In the southern San Joaquin Valley, this includes the Kern and Pixley National Wildlife Refuges, and other scattered areas within Kern, Tulare, and Kings Counties.

The Tipton kangaroo rat is limited to arid-land communities occupying the valley floor of the Tulare Basin in level or nearly level terrain. They occupy alluvial fan and floodplain soils ranging from fine sands to clay-sized particles. Generally, woody shrubs of one or more species are sparsely scattered over occupied terrain with scant-to-moderate ground cover of grasses and forbs. Tipton kangaroo rats are commonly associated with spinescale saltbush (*Atriplex spinifera*), Allscale saltbush, leafcover saltweed (*Atriplex covillei*), quailbush, iodine bush, alkali goldenbush, mesquite (*Prosopis glandulosa*), and seepweed (Williams 1985).

The Tipton kangaroo rat eats mostly seeds, with small amounts of green, herbaceous vegetation and insects supplementing their diet when available (USFWS 1998). Little is known about Tipton kangaroo rat reproduction in the wild. Mating appears to begin in the winter and most females seem to have one litter per year, although litters of two or more may be born during exceptional years (USFWS 1998). Young are born in burrows.

Burrow systems are usually in open areas, but may occur in thick scrub. They are typically simple, but may include interconnecting tunnels. Most are less than 10 inches deep. Burrows are most prominent on slightly elevated mounds, the berms of roads, canal embankments, railroad beds, and bases of shrubs and fences where wind-blown soils accumulate above the level of surrounding terrain.

Loss, fragmentation, and degradation of habitat associated with agricultural conversion in the San Joaquin Valley continue to decrease the remaining habitat of the Tipton kangaroo rat. As a result of industrial and agricultural related developments, cultivation, formation of patches of exotic grasses, urbanization, and flooding, there is an increase of habitat destruction or modification (USFWS 1998). The more common Heermann's kangaroo rat may competitively exclude or reduce the density of Tipton kangaroo rats where they co-occur.

OCCURRENCE WITHIN THE PERMIT AREA

Tipton kangaroo rats were trapped on Site 1-C and portions of Site 9-C, and on lands adjacent to Sites 2-S, 3-S, and 10-C during the small mammal trapping surveys conducted for the Project (Quad Knopf 2010c). This species may be present within the railroad easement in Sites 6-S and 7-S, and along the South Lake Road easement to the north of Site 7-S and to the east of Site 15-S, although the species was not captured at those locations. Similarly, this species may be present along the berm and canal embankments that are located at the north of Site 3-S. CNDDB records from 1985 show occurrence of the species along the south border of Site 1-C, north border of Site 5-S, to the east of Site 2-S, and on and to the west of Site 3-S. The regular disking on the

Solar Development Footprint has eliminated this species from areas where it once occurred. CNDDDB records of Tipton kangaroo rat consist of multiple records from 1985 located to the north of Site 4-S, within a five-mile radius of the Permit Area; and a record located southwest of Site 5-S from unknown year. Currently, no habitat that would support this species exists at these locations. Tipton kangaroo rat is expected to forage onto the Solar Development Footprints of Sites 2-S and 3-S, and perhaps into Sites 6-S and 7-S. This species is likely to invade at least some of the Solar Sites very soon after cessation of disking.

Nelson's Antelope Squirrel (Ammospermophilus nelsoni)

STATUS

The Nelson's antelope squirrel was designated a threatened species by the State of California in 1980. The Nelson's antelope squirrel was removed as a Category 1 candidate for federal listing in 1995. Conservation actions are addressed in the Recovery Plan for Upland Species of the San Joaquin Valley (USFWS 1998). Actions required to conserve the Nelson's antelope squirrel include the following: determination of habitat management prescriptions for Nelson's antelope squirrels on the southern San Joaquin Valley floor; an inventory of potential habitat for Nelson's antelope squirrels in the Allensworth, Semitropic Ridge, and Kettleman Hills natural areas, and along the western edge of the Valley between Pleasant Valley, Fresno County, and McKittrick Valley-Lokern Area, Kern County; protection of additional habitat for Nelson's antelope squirrels in the Pixley National Wildlife Refuge, Allensworth Natural Area; development and implementation of a population monitoring program for Nelson's antelope squirrels at sites representative of their existing geographic range; and protection of additional habitat for Nelson's antelope squirrels in the Panoche Region of western Fresno, eastern San Benito Counties, western Kern County, and the Semitropic Ridge Natural Area (USFWS 1998).

LIFE HISTORY

Nelson's antelope squirrels are restricted to desert and scrubland habitats. The historical geographic range occurred within the southern and western areas of the Tulare Basin, the San Joaquin Valley, and up to the Cuyama Valley and the Carrizo and Elkhorn Plains. Its current range is now estimated to be uncultivated habitat within the San Joaquin Valley. This species is thought to be extirpated from the Tulare Basin floor, only occurring in the marginal habitat in the foothills of the mountains bordering the west of the basin. Populations of Nelson's antelope squirrel occur in Lokern and Elk Hills, and on the Carrizo and Elkhorn Plains. In all, approximately 102,055 acres have been deemed fair to adequate habitat for Nelson's antelope squirrels within its historic range (USFWS 1998).

Habitat of Nelson's antelope squirrels consist of grasslands with moderate shrub cover, which includes such species as salt bush, ephedra (*Ephedra* sp.), bladder pod (*Peritoma arborea*), goldenbush (*Isocoma* sp.), snakeweed (*Gutierrezia* sp.), and others. The squirrels live in small underground familial colonies on sandy, easily excavated grasslands.

Nelson's antelope squirrels are opportunistic omnivores. Common food is green vegetation and insects, but is largely dependent on what is seasonally available (Hawbecker 1975; Harris 1993). Nelson's antelope squirrels are largely diurnal and are active for much of the day. However,

during extreme high or low temperatures they will often stay in their ground burrows. Nelson's antelope squirrels often excavate their own ground burrows, but if the opportunity presents itself they will use a burrow that was constructed by another small mammal, such as kangaroo rats.

Nelson's antelope squirrels breed between late winter and early spring. Young are usually born between March and April. Only one litter is produced each year. Mortality rates of young are about 70 percent their first year, and the annual adult survival rate is between 50 and 60 percent (Williams and Tordoff 1988).

Nelson's antelope squirrels are social animals (Grinnell and Dixon 1916). They do not expend much energy throughout the day because of the extreme temperatures in their environment (Hawbecker 1953), and there is little activity during the heat of the day. Although there is no evidence of hibernation, the squirrels are not bothered by the cold and can survive temperatures below freezing in their burrows (Hawbecker 1958). The squirrels are also known to fully stretch out and roll over in the dust on the ground. These dust baths appear to be very enjoyable activities for the squirrels and may also be used to prevent infestation of parasites (Hawbecker 1959).

Nelson's antelope squirrels are cautious when emerging from their burrows (Grinnell and Dixon 1916). They have a specific route that they follow when foraging for food. If danger seems near, they will run into a burrow along their foraging route to get to safety (Hawbecker 1953). They move quickly and do not spend much time in one place (Hawbecker 1975). The whitish color of the underside of their tails can be seen when they run. The squirrels will curl their tails forward over their backs, and flick and twitch them back and forth as they run (Grinnell and Dixon 1916). This movement can present the illusion of thistledown fluttering in the wind, which could be ignored by any potential predators (Grinnell and Dixon 1916). To further help prevent predation, the Nelson's antelope squirrel has an alarm call. These alarm calls are not loud, but associated with convulsive body movements (Taylor 1916).

OCCURRENCE WITHIN THE PROJECT AREA

Nelson's antelope squirrels were observed on 83.25 acres of native habitat on the southeastern portion of Site 9-C, adjacent to the north and west sides of Conservation Site 1-C, on the west side of Conservation Site 9-C, and on the west and south sides of Conservation Site 10-C (See Appendix B). Nelson's antelope squirrel was not observed to occur within any of the Solar Sites and there is currently no habitat on the Solar Sites that could support this species. All lands in the Permit Area are potential habitat and with the cessation of disking and natural revegetation of project lands, foraging and breeding habitat is expected to occur. At that time, the Project lands will become more suitable to support Nelson's antelope squirrel and will place the species at risk of project impacts.

The CNDDDB has 28 records of Nelson's antelope squirrels occurring within a five-mile radius of the Project site between 1918 and 2006. Historically the largest concentration of sightings is to the west of Sites 1-C and 5-S; however, habitat capable of supporting this species is no longer present west of Site 5-S. The proximity of Nelson's antelope squirrel to the Project makes it likely that the species will become present at some point over the 35-year period of the permit.

Western Burrowing Owl (Athene cunicularia)

STATUS

The western burrowing owl is listed by CDFW as a California Species of Concern (CSC) and is protected by the Migratory Bird Treaty Act (MBTA). There is no current federal status, but there have been several petitions to list this owl as a federally threatened or endangered species. It is possible that it will become listed during the life of the project.

There is no recovery plan for the western burrowing owl. Common management efforts employed to conserve existing western burrowing owl colonies include prevention of all disturbances during the nesting season, installation of permanent artificial burrows, and management of the vegetation around the burrows by mowing or managed grazing.

LIFE HISTORY

The western burrowing owl is a summer resident in the western half of the U.S., and a year-round resident in the southwestern portion of the U.S., and northern and central Mexico. In California, the species inhabits the lowlands of the Central Valley and the desert environments of the southeastern part of the state. Although western burrowing owls still exist in most portions of their historic range, their population densities have declined due to habitat loss, degradation, and fragmentation.

Western burrowing owls occupy grasslands, deserts, sagebrush scrub, agricultural areas (including pastures and untilled margins of cropland), earthen levees and berms, coastal uplands, and urban vacant lots; as well as the margins of airports, golf courses, and roads. Western burrowing owls select sites that support short vegetation, even bare soil, presumably because they can easily see over it. However, they will tolerate tall vegetation if it is sparse. Owls will perch on raised burrow mounds or other topographic relief, such as rocks, tall plants, fence posts, and debris piles, to attain good visibility (Haug et al. 1993). Western burrowing owls are primarily crepuscular in their foraging habits, but will hunt for insects and small vertebrates during both day and night.

The breeding season of the western burrowing owl begins in March or April and extends through August. Average clutch size is five or six eggs, and they rarely produce a second brood. Where site conditions are optimal, western burrowing owls sometimes form loose colonies, which is unusual for avian predators (Haug et al. 1993). The female will lay an egg every 1 or 2 days until she has completed a clutch, which can consist of 4 to 12 eggs (usually 9). She will then incubate the eggs for three to four weeks while the male brings her food. After the eggs hatch, both parents will feed the chicks. Four weeks after hatching, the chicks are able to make short flights and begin leaving the nest burrow. The parents will still help feed the chicks for 1 to 3 months. While most of the eggs will hatch, only 4 to 5 chicks usually survive to leave the nest.

During the breeding season, western burrowing owls spend most of their time within 162 to 325 feet of their nest or satellite burrows (Haug and Oliphant 1990). During the day, they forage in the vicinity of the natal burrow, where they find it easy to prey on insects in low, open vegetation. Western burrowing owls will nest in loose colonies, although owls display intraspecific territoriality immediately around the nest burrow (Haug et al. 1993). Western

burrowing owls in California typically begin pair formation and courtship in February or early March, when adult males attempt to attract a mate.

When hunting, western burrowing owls will take advantage of natural perches to wait until they spot prey. They then swoop down on prey or fly up to catch insects in flight. Sometimes, they chase prey on foot across the ground.

An immediate threat to the western burrowing owl is the conversion of grassland habitat to urban and agricultural uses, and the loss of suitable agricultural lands to development. Equally important is the loss of fossorial rodents, such as small ground squirrel species, across much of the owl's historical range. Another cause of population declines is thought to be pesticide use, but evidence does not clearly indicate that other contaminants are reducing populations (Gervais et al. 1997). Habitat fragmentation (Remsen 1978) probably increases foraging distances, making hunting less efficient and potentially reducing reproductive success. In urban settings, owls occurring in isolated habitats may experience frequent disturbances from adjacent land uses and barriers to foraging areas.

OCCURRENCE WITHIN THE PERMIT AREA

Western burrowing owls were observed on Solar Sites 3-S, 6-S, 7-S and on Conservation Sites 3-C2 and 9-C (see Appendix B) (Quad Knopf 2010c). Western burrowing owls were also observed adjacent to Sites 1-C, 2-S, 2-M, 3-C, 5-S, 10-C and 15-S (Quad Knopf 2010a). Site 17-C contains suitable habitat to support this species, but it was not observed during surveys of that Site.

Quad Knopf found nine records of western burrowing owls occurring within a five-mile radius of the project area (CDFG 2009) (see Figure 3-5A). One of those records, from 2005, is of western burrowing owl located on Sites 3-S, 3-C, 3-C2, and 3-M. The CNDDDB records from 2000, 2002, 2004, 2006 found western burrowing owls occurring between one and five miles to the northwest of Site 1-C, and occurrence records from 1998, 1999, and 2004 found western burrowing owls about 1.3 miles to the south of Site 5-S (see Figure 3-5A).

Blunt-nosed Leopard Lizard (Gambelia sila)

STATUS

The blunt-nosed leopard lizard was listed as endangered by the U.S. Department of the Interior in 1967 and by the State of California in 1971, and is also listed as a fully protected species by the state.

A recovery plan for this species was first prepared in 1980 and revised in 1985. Conservation efforts have included habitat and population surveys, studies of population demography and habitat management, land acquisition, and development of management plans for public lands that have benefitted blunt-nosed leopard lizards as well as other listed species. The three most important factors in recovering the blunt-nosed leopard lizard are determining appropriate habitat management and compatible land uses for the species, protecting additional habitat for the species in key portions of its range, and gathering additional data on population responses to

environmental variation at representative sites in the species' extant geographic range (USFWS 1998).

LIFE HISTORY

Historically, the blunt-nosed leopard lizard occurred in the southern San Joaquin Valley and adjacent western and southern foothills. The current distribution is restricted to scattered sites in the southern San Joaquin Valley, Carrizo Plain, Elkhorn Plain, and southeastern Cuyama Valley. This distribution roughly corresponds with the western half of Kern County, the eastern boundary of San Luis Obispo and Kings Counties, the western boundary of Fresno County, and extreme southwestern Tulare County. These lizards are rare and localized in suitable habitat throughout their current range (Quad Knopf 2010c).

Blunt-nosed leopard lizards are typically associated with sparsely vegetated, arid habitats of saltbush scrub, alkali sinks, non-native grasslands, Ephedra scrub, and washes. Most of these habitat types have been lost to agricultural conversion, oil production, and urbanization; and the blunt-nosed leopard lizard currently occurs in less than 15 percent of its historic distribution (USFWS 1998).

The blunt-nosed leopard lizard is a carnivorous predator that feeds primarily on insects (mostly grasshoppers, crickets, and moths) and other lizards. Lizard species taken as prey include side-blotched lizards, coast horned lizards, California whiptails, and spiny lizards. Young of its own species are also eaten (USFWS 1998).

Blunt-nosed leopard lizards are in reproductive status from April to July. Females typically lay eggs between May and June. Clutch size averages three eggs, with a range of one to six eggs. One clutch per season is the normal pattern, but females may produce a second, third, or even fourth clutch if environmental conditions are favorable (Jennings 1995; Germano and Williams 1992, 2005; USFWS 1998). Quad Knopf found no current data for population densities of blunt-nosed leopard lizards, but Uptain *et al.* (1992) reported densities ranging from 0.1 to 4.2 individuals per acre at the Pixley National Wildlife Refuge in Tulare County.

The optimum activity period for the blunt-nosed leopard lizard occurs when air temperatures are between 77 and 95 degrees F and soil temperatures are between 86 and 122 degrees F. On hotter days, they are active in the early morning and late afternoon, and use small rodent burrows during the day. Blunt-nosed leopard lizards are highly territorial.

OCCURRENCE WITHIN THE PERMIT AREA

No blunt-nosed leopard lizards were observed on the Solar Sites (Quad Knopf 2010c, 2012); however, four blunt-nosed leopard lizards were observed on lands adjacent to Sites 2-S and 3-S (see Appendix B) (Quad Knopf 2010c). The closest known CNDDDB record reported the species 1.8 miles northwest of Site 1-C in 2002 (Figure 3-5D). Very little blunt-nosed leopard lizard habitat is available within the Permit Area due to regular disking. Limited use of the Permit Area by blunt-nosed leopard lizards may occur in the northwest corner of Site 1-C, the eastern side of Site 2-S, and the western side of Site 3-S.